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Part II

Department of Energy

Office of Conservation and Solar Energy

Energy Conservation Program for Consumer Products

DEPARTMENT OF ENERGY

Office of Conservation and Solar Energy

10 CFR Part 430

Energy Conservation Program for Consumer Products

AGENCY: Department of Energy.

ACTION: Proposed rule.

SUMMARY: Proposed Rulemaking, Public Meeting and Public Hearings Regarding Energy Efficiency Standards for Refrigerators and Refrigerator-Freezers, Freezers, Clothes Dryers, Water Heaters, Room Air Conditioners, Home Heating Equipment not including Furnaces, Kitchen Ranges and Ovens, Central Air Conditioners, and Furnaces.

The Energy Policy and Conservation Act, as amended by the National Energy Conservation Policy Act, requires that the Department of Energy prescribe energy efficiency standards for consumer products. The Department is today proposing to amend 10 CFR Part 430 to include energy efficiency standards for classes of refrigerators and refrigerator-freezers, freezers, clothes dryers, water heaters, room air conditioners, home heating equipment not including furnaces, kitchen ranges and ovens, central air conditioners and furnaces. The rule proposed today establishes intermediate and final energy efficiency standards for the above-mentioned covered products. The proposed rule also includes amendments to the State manufacturer preemption petitions found at Subpart D, a new Subpart E containing procedures for small business exemptions, and a new Subpart F containing certification and enforcement procedures.

The purpose of this notice of proposed rulemaking is to provide interested persons an opportunity to comment upon the proposed rule, and to invite interested persons to participate in the energy efficiency standards rulemaking process.

DATES: Written comments on this proposed rule must be received by the Department by August 29, 1980 in order to be included in the docket.

Public Meeting, Washington, D.C.: Pursuant to section 336(a)(2) of the Act, there will be a public meeting in Washington, D.C., at which interested parties may present question(s) regarding this rule for the purpose of clarification of issues. Written question(s) for clarification must be submitted to DOE no later than 5:00 p.m., July 8, 1980. Persons attending this meeting will also have an opportunity to question those persons making written or oral presentations with respect to disputed issues of material fact. The public meeting will be held on July 16, 1980 at the time and place noted below.

Public Hearing, Washington, D.C.: The Washington, D.C. public hearing will be held August 11 through 15, 1980, and will continue into the week of August 18, 1980 as necessary in order to accommodate all interested speakers; requests to speak must be received by the Department no later than 5:00 p.m., July 18, 1980; speakers will be notified by 5:00 p.m., July 28, 1980; written statements must be received by the Department no later than 5:00 p.m., August 4, 1980. Interested parties are given an opportunity for oral presentations of views, data and arguments on the proposed rule.

Public Hearing, Chicago, Illinois: The Chicago, IL public hearing will be held beginning August 25, 1980, and will continue throughout that week as necessary in order to accommodate all interested speakers; requests to speak must be received by the Department no later than 5:00 p.m., July 28, 1980; speakers will be notified by 5:00 p.m., August 4, 1980; written statements must be received by the Department no later than 5:00 p.m., August 18, 1980.

ADDRESSES: Written comments, requests to speak at the hearings, and statements are to be submitted to: Carol A. Snipes (Hearing Procedures), U.S. Department of Energy, Office of Conservation and Solar Energy, Office of Hearings and Dockets, Energy Efficiency Standards for Consumer Products, Docket No. CAS–RM–78–110, Mail Station 6B–025, Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C. 20585.

The public meeting is to be held at: Room 3000A, Federal Building, 12th and Pennsylvania, Washington, D.C., on July 16, 1980 at 9:00 a.m. The two public hearings are to be held at: Room 3000A, Federal Building, 12th and Pennsylvania, Washington, D.C., on August 11–22, 1980, at 9:00 a.m. and Everett McKinley Dirksen Federal Building, 219 South Dearborn Street, Chicago, IL, on August 25–29, at 9:00 a.m.

FOR FURTHER INFORMATION CONTACT:

James A. Smith, U.S. Department of Energy, Office of Conservation and Solar Energy, Division of Buildings and Community Systems, Consumer Products Efficiency Branch, Room GH–065, Mail Station 6B–025, Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C. 20585, (202) 252–9127.

Carol A. Snipes (Hearing Procedures), U.S. Department of Energy, Office of Conservation and Solar Energy, Office of Hearings and Dockets, Mail Station 6B–025, Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C. 20585, (202) 252–9319.

Eugene Margolis, Esq., U.S. Department of Energy, Office of General Counsel, Room 1E–254, Mail Station 6A–152, Forrestal Building, 1000 Independence Avenue, S.W., Washington, D.C. 20585, (202) 252–9510.

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1. Introduction

1.1 Purpose and Scope of This Notice

Section 325 of the Energy Policy and Conservation Act (EPCA) (P.L. 94–163),

as amended by section 422 of the National Energy Conservation Policy Act (NECPA) (P.L. 95–619), requires that the Department of Energy (DOE) prescribe energy efficiency standards for the types of consumer products listed in section 322(a) of the Act.[1] These consumer products are sometimes referred to as "covered products." Standards for nine of these covered products are required by section 325, as amended, to be published in the **Federal Register** no later than January 2, 1981. The nine covered products given priority by the Act, and for which a rule is hereby proposed today, are refrigerators and refrigerator-freezers, freezers, clothes dryers, water heaters, room air conditioners, home heating equipment not including furnaces, kitchen ranges and ovens, central air conditioners (cooling only), and furnaces.

DOE's first step in prescribing energy efficiency standards for the nine covered products was to publish an advance notice of proposed rulemaking in the **Federal Register** of January 2, 1979 (44 FR 49). Section 325(i)(3) of the Act requires DOE, as a subsequent step in establishing energy efficiency standards for consumer products, to publish a notice of proposed rulemaking, proposing energy efficiency standards for each type or class of covered product, and to invite comments from interested persons relevant to establishing the energy efficiency standards. This notice constitutes the second step.

Because of the impact of the standards on the public, DOE has provided in Section 11 of this notice an opportunity for public comment, pursuant to section 325(i)(3) of the Act, on the following matters, among others:

(A) Whether the proposed standards are economically justified;

(B) Whether the standard will achieve the maximum improvement in energy efficiency which is technologically feasible;

(C) If the standard does not achieve such improvement, whether the reasons for not achieving such improvement are adequate; and

(D) Whether the proposed rule should prescribe a level of energy efficiency which is higher or lower than that which would otherwise apply in the case of any group of products within the type (or class) that is subject to the proposed standard.

DOE expects that the comments received as a result of this notice will provide additional technical and economic information which will assist DOE in developing a final rule that is expected to be prescribed in December 1980.

Accordingly, this notice presents a discussion of DOE's basis for the proposed standards and the process for implementing the regulation. Ensuing sections deal with the legislative background, the standards implementation process, the phase-in period for standards, a discussion of the comments received as a result of the advance notice, a discussion of the covered products and classes to which the proposed standards will apply, the certification and enforcement procedures proposed, a summary of the basis for arriving at maximum technologically feasible efficiency levels for each class of product, a summary of the basis for arriving at the energy efficiency standards (intermediate and final) for each class of product, a discussion of state/manufacturer preemption petitions, small business exemptions, and a request for comments on various standards-related issues. In support of this proposed rule, the Department has developed five Technical Support Documents. These documents provide detailed information on important aspects of the proposed rule and are referred to throughout the preamble.

Number and Title
1—Draft Regulatory Analysis
2—Environmental Assessment
3—Certification and Enforcement Document
4—Economic Analysis Document
5—Engineering Analysis Document

Copies of the proposed rule and all of the Technical Support Documents, as well as other documents specifically identified in this proposed rule, may be obtained from and will be available for public review under Docket No. CAS–RM–78–110 at the Office of Hearings and Dockets at the address specified at the begining of this notice or the DOE Freedom of Information Office, between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday, except Federal holidays at the following address: Department of Energy, Freedom of Information Reading Room, Room 5B–180, Forrestal Building, 1000 Independence Avenue, SW., Washington, D.C. 20585, (202) 252–6020.

A limited supply of the proposed rule and Technical Support Documents will also be available upon request through August 29, 1980 from the Office of Hearings and Dockets between the hours of 9:00 a.m. and 5:00 p.m. Monday through Friday, except Federal holidays at the following address: Department of Energy, Office of Hearings and Dockets, Room 1F–085, Forrestal Building, Mail Station 6B–025, 1000 Independence Avenue, SW., Washington, D.C. 20585, (202) 252–9319.

Interested persons are invited to provide views, written presentations of data, and arguments relevant to establishing the interim and final energy efficiency standards for the nine types of consumer products.

1.2 Authority

1.2.1 Background. The energy conservation program for consumer products is designed to require manufacturers to produce, and consumers to purchase, significantly more efficient products. The legislative plan enacted by Congress sets forth two interrelated elements for accomplishing this objective. The first element is to require manufacturers to produce more efficient products, and the second is to inform the purchaser of consumer products of the relative energy efficiency, annual operating costs and other energy use factors of the products. Given this information, the purchaser will be equipped to select the more energy efficient products.

The first element, described in section 325 of EPCA, prior to amendment by NECPA, called for the promulgation of voluntary efficiency improvement targets representing aggregate industry efficiency improvements that were to be achieved by 1980. As an incentive for the industry to try and achieve these targets, a reporting and monitoring system was to be established by DOE to track industry progress. In the event that achievement of a target for a particular covered product appeared unlikely, DOE would have been required to initiate an administrative proceeding to prescribe a mandatory energy efficiency standard for the covered product in question.

In NECPA, the target program was replaced with a mandatory energy efficiency standards program. Section 422 of NECPA amended section 325 of EPCA to provide for a mandatory energy efficiency standards program.

The second element set forth in section 324 of the Act involves the development of a labeling program requiring manufacturers to label covered products with energy cost or consumption information which will assist consumers in making purchasing decisions. The Federal Trade Commission (FTC) has the responsibility for developing the labeling rules and administering the labeling program. The final rule for labeling only included room air conditioners, furnaces, clothes washers, dishwashers, water heaters, refrigerators and refrigerator-freezers,

[1] This and subsequent references to the "Act", and sections of the Act, refer to EPCA as amended by NECPA.

and freezers and appeared in the **Federal Register** of November 19, 1979 (44 FR 66466). Labeling requirements are expected to be issued for central air conditioners and heat pumps in the near future.

In conjunction with the issuance of the labeling rules, section 337 of the Act requires DOE to develop a consumer education program that will enhance consumer awareness of the need for energy conservation and create a better understanding of the information provided on the labels. This is intended to encourage comparison shopping and to generate consumer demand for the more efficient products. As a consequence, it is anticipated that manufacturers will be influenced to expedite efficiency improvements for their various product lines to meet the market demand.

In order to further effectuate these programs, section 323 of the Act requires that DOE develop test procedures for the determination of estimated annual operating costs and at least one other measure of energy consumption for each covered product (energy factor, energy efficiency ratio, seasonal energy efficiency ratio, annual fuel utilization efficiency) which will assist consumers in making purchasing decisions. Testing by manufacturers in accordance with these test procedures will serve as a basis for: (1) the energy cost and consumption information that will be required to be included on product labels under the FTC labeling program and (2) representations by manufacturers regarding the energy consumption characteristics of their product. Also, measurements of efficiency which are derived from the test procedures will be used as the basis for energy efficiency standards. Manufacturers will be required to establish that their products are in conformance with the standards by testing in accordance with the test procedures. Further, compliance with the standards will be determined by using these test procedures. DOE has prescribed final test procedures for the covered products included in this notice, and the citation to each of the rules is listed in Table 1-1.

The test procedure design is flexible enough to allow for technological variation among different basic models within a covered product. In order to provide comparable measurements of energy consumption, the test procedures must assure that different manufacturers' product lines will be subject to the same measurement criteria. DOE is aware that new products or designs will be developed which either do not fall under the product test procedures or incorporate unique design characteristics which prevent testing according to the test procedures, or the prescribed test procedures evaluate the product in a manner unrepresentative of its true energy consumption characteristics. DOE intends, on a continuing basis, to modify test procedures to accommodate new product designs, as necessary. The Department has proposed provisions allowing it to temporarily waive test procedure requirements in these cases. The proposed waiver provisions appeared in the **Federal Register** of March 4, 1980 (45 FR 14188).

Table 1-1.—Federal Register *Citations for Test Procedures*

Covered product type	Proposed rule	Final rule
1. Refrigerators and Regrigerator-Freezers.	(42 FR 21576) Apr. 27, 1977.	(42 FR 46140) Sept. 14, 1977.
2. Freezers	(42 FR 21576) Apr. 27, 1977.	(42 FR 46140) Sept. 14, 1977.
3. Dishwashers	(42 FR 15423) Mar. 22, 1977.	(42 FR 39964) Aug. 8, 1977.
4. Clothes Dryers	(42 FR 21576) Apr. 27, 1977.	(42 FR 46145) Sept. 14, 1977.
5. Water Heaters	(42 FR 21576) Apr. 27, 1977.	(42 FR 54110) Oct. 4, 1977).
Amendment (Energy Factor).	(43 FR 13888) Apr. 3, 1978.	(43 FR 48986) Oct. 19, 1978.
Amendment (First Hour Rating.	(44 FR 27191) May. 9, 1979.	(44 FR 52632) Sept. 7, 1979.
6. Room Air Conditioners	(41 FR 31237) July 27, 1976.	(42 FR 27896) June 1, 1977.
Amendment (packaged terminal air conditioners).	(45 FR 2632) Jan. 11, 1980.	
7. Home Heating Equipment (not including furnaces).	(23 FR 23860) May 11, 1977 (unvented).	(43 FR 20128) May 10, 1978.
	(42 FR 43930) Aug. 31, 1977 (vented).	(43 FR 20147) May 10, 1978.
8. Television Sets	(42 FR 21576) Apr. 27, 1977.	(42 FR 46145) Sept. 14, 1977.
9. Kitchen Ranges and Ovens	(42 FR 65576) Dec. 30, 1977.	(43 FR 20108) May 10, 1978.
10. Clothes Washers	(42 FR 25329) May 17, 1977.	(42 FR 49802) Sept. 28, 1977).
11. Humidifiers and Dehumidifiers.	(42 FR 27941) June 1, 1977.	(42 FR 55599) Oct. 18, 1977.
12. Central Air Conditioners (Cooling only).	(42 FR 30401) June 14, 1977.	(44 FR 60150) Nov. 25, 1977.
Amendment (heat pumps)	(44 FR 23468) Apr. 6, 1979.	(44 FR 76700) Dec. 27, 1979.
13. Furnaces	(42 FR 40826) Aug. 11, 1977.	(43 FR 20147) May 10, 1978).
Amendments to Furnaces	(45 FR 1298) Jan. 4, 1980.	
14. Test Procedure Waiver	(45 FR 14188) Mar. 4, 1980.	

1.2.2 Statutory Objectives. The Act requires that energy efficiency standards be prescribed for all the consumer product types listed in section 322(a). "Energy efficiency standard" means a performance standard which prescribes a minimum level of energy efficiency for a covered product. Such standard will prescribe either the same energy efficiency level or an energy efficiency level which varies with capacity for all of the basic models of the class of covered product. Energy efficiency standards utilize the test procedures prescribed in 10 CFR Part 430, Subpart B, and any requirements imposed on manufacturers which DOE determines are necessary to assure that each covered product to which a standard applies meets the required energy efficiency level specified in the standard.

Priority is required by the Act to be given to refrigerators and refrigerator-freezers, freezers, cloths dryers, water heaters, room air conditioners, home heating equipment not including furnaces, kitchen ranges and ovens, central air conditioners (cooling only), and furnaces. The second set of products: dishwashers, television sets, humidifiers and dehumidifiers, and clothes washers were the subject of a separate advance notice which was published in the **Federal Register** (44 FR 72276), of December 13, 1979. An advance notice for central air conditioners (heat pumps) was published in the **Federal Register** of January 23, 1980 (45 FR 5602). A notice of proposed rulemaking for the second set of products including central air conditioners (heat pumps) is to be published in the **Federal Register** by March 1981. In addition to those covered products specifically identified, the Act also permits DOE to prescribe standards for other consumer products which meet certain criteria stated in section 325(a)(2). A list of such products which DOE considers may be subject to standards is required to be published no later than November 9, 1980, but the list may be revised thereafter.

The standards proposed are required by section 325(c) to be designed so as to achieve the maximum improvement in energy efficiency which is technologically feasible and

economically justified. Under section 325(b), however, no standard can be presribed for a particular type or class of covered product if: (1) there is no DOE test procedure for the type or class; or (2) DOE determines, by rule, that the establishment of a standard for the particular type or class would not result in significant conservation of energy or is not technologically feasible or economically justified.

Section 325(d) provides that before DOE determines whether a standard is economically justified, it must first solicit comments on a proposed standard in accordance with the procedure set forth in sections 336(a) and 325(i). After reviewing comments on the proposal, DOE must then determine that the benefits of the standard exceed its burdens based, to the greatest extent practicable, on a weighing of the following seven factors:

(1) The economic impact of the standard on the manufacturers and on the consumers of the products subject to such standard,

(2) The savings in operating costs throughout the estimated average life of the covered products in the type (or class), compared to any increase in the price of, or in the initial charges for, or maintenance expenses of the covered products which are likely to result from the imposition of the standard,

(3) The totel projected amount of energy savings likely to result directly from the imposition of the standard,

(4) Any lessening of the utility or the performance of the covered products likely to result from the imposition of the standard,

(5) The impact of any lessening of competition, determined in writing by the Attorney General, that is likely to result from the imposition of the standard,

(6) The need of the Nation to conserve energy, and

(7) Any other factors which DOE considers relevant.

In developing the consumer products efficiency standards, the economic effects of alternative efficiency levels were systematically analyzed. To weigh effectively the above seven legislative criteria, it was necessary to quantify the expected consequences of energy efficiency regulations, including impacts on consumers, manufacturers, and the Nation. This analysis is discussed in depth in section 5 of this notice.

Section 325(f) of the Act provides that energy efficiency standards do not have to be identical for all products within a type or class provided either of two conditions are met: (1) they consumer different types of fuel, or (2) they have a capacity or other performance-related feature which other products within the same type or class do not have. For example, within a type, different standards based on performance are prescribed for split system central air conditioners, and single package central air conditioners, and within a class, refrigerator-freezers with side freeezers have different standards depending on volume or capacity of the unit.

Section 325(e) provides that manufacturers having annual gross revenues not exceeding $8,000,000 may apply to DOE for an exemption from all or part of the requirements of an energy efficiency standard. This exemption may not extend beyond 2 years from the effective date of any standards requirement. This authority will not be exercised by DOE unless, after consultation with the Attorney General, the Secretary finds that failure to allow the exemption would likely result in a lessening of competition. This exemption is discussed in greater detail in section 8, "Small Business Exemptions."

Other provisions of the Act are: (1) a review of test procedures within 3 years of NECPA enactment and from time to time thereafter [section 323(a)(7)]; (2) reevaluation of the standards within 5 years of prescription [section 325(h)]; (3) procedures for preemption of state energy efficiency regulations [section 327].

Section 326 of the Act imposes requirements upon manufacturers to assure that each covered product to which a standard applies meets the required energy efficiency level. DOE is today proposing certification provisions which include testing by the manufacturer and submission of data to DOE before a manufacturer may introduce products into commerce. Section 333 provides that any persons who knowingly violate any provision of section 332 (which enumerates prohibited acts) shall be subject to civil penalties.

Enforcement-related provisions of the Act provide for: (1) DOE to prescribe rules requiring manufacturers to allow the Department to observe testing and inspect results of testing conducted by the manufacturer or his agent [section 326(b)(5)]; (2) manufacturers to supply to DOE a reasonable number of products for testing purposes [section 326(b)(3)]; (3) manufacturers to submit information or reports necessary to ensure compliance [section 326(d)]; and (4) injunctive relief against any prohibited act, including distribution of noncomplying products [section 334]. These enforcement-related provisions are detailed in section 6, "Certification and Enforcement."

1.3 Planned Regulatory Action

1.3.1 Introduction. As DOE's first step in prescribing energy efficiency standards, an advance notice of proposed rulemaking for the nine covered products: refrigerators and refrigerator-freezers, freezers, clothes dryers, water heaters, room air conditioners, home heating equipment not including furnaces, kitchen ranges and ovens, central air conditioners (cooling only), and furnaces was published in the **Federal Register** of January 2, 1979 (44 FR 49). An advance notice of proposed rulemaking for dishwashers, television sets, clothes washers, and humidifiers and dehumidifiers appeared in the **Federal Register** of December 13, 1979 (44 FR 72276) and for central air conditioners (heat pumps) on January 23, 1980 (45 FR 5602).

Today, DOE is proposing energy efficiency standards for refrigerators and refrigerator-freezers, freezers, clothes dryers, water heaters, room air conditioners, home heating equipment not including furnaces, kitchen ranges and ovens, central air conditioners (cooling only), and furnaces.

The Act defines energy efficiency standards as performance standards which establish the minimum energy efficiency level required to be achieved by each type of covered product or class. "Type" of covered products refers to one of the categories of consumer products designated in section 322 of the Act identified by DOE as having met the criteria stated in section 325(a) of the Act. "Class" of covered product means in general a group of basic models within a covered product that constitute a type which has the same primary energy source. Products may have a different capacity or other performance related feature which affects the energy efficiency of the product. The standards will not prescribe the means by which the level is reached. The standards will apply only to those covered products manufactured after the effective date of the final rule, and not intended for export.

1.3.2 Criteria for Selection of Classes. DOE has grouped the basic models of each covered product into classes which account for type of fuel used and performance related features. These classes were determined with the use of data supplied by interested persons in response to DOE's advance notice of proposed rulemaking. Different classes may be specified in the final rule if DOE receives data, views and arguments which justify changes. DOE used the following criteria to group

basic models of each covered product into classes:

(1) DOE has specified separate classes for basic models which have a different primary energy source, i.e., oil, gas, or electricity.

(2) DOE has specified separate classes in order to assure, to the extent practicable, consistent with the intent of the Act, that consumer products having a different capacity or other performance-related feature which affect efficiency and utility, remain available to consumers. Separate classes are established when the feature causes the energy efficiency of models with the feature to be different from that of models without the feature.

1.3.3 Determination of the Maximum Technologically Feasible Energy Efficiency Level by Product Class. The rule proposed today identifies the maximum technologically feasible energy efficiency level and sets forth the energy efficiency levels that the Department believes are economically justified for each class of covered consumer product subject to this notice. This determination was made in part on the basis of data supplied to DOE by manufacturers and other interested parties in response to the advance notice of proposed rulemaking which appeared in the **Federal Register,** January 2, 1979 (44 FR 49), and the notice of opportunity for further comment, which appeared in the **Federal Register,** August 24, 1979 (44 FR 49696). In addition, data were obtained at public meetings conducted in January and February of 1979, from the National Bureau of Standards and from DOE contractors.

The maximum technologically feasible energy efficiency levels identified here may be modified in the final rule either as a result of (i) modifying the definition of "maximum technologically feasible energy efficiency level," (ii) receipt of additional information regarding the highest levels of energy efficiency of basic models expected to be commercially available in 1986, or (iii) efficiency improvements that are expected to be commercially available by 1986. In addition, if after efficiency standards are prescribed, DOE determines that standards are justified for a nonregulated class either due to receipt of additional information regarding the level of energy efficiency improvements possible, significant increase in the number of units sold in that nonregulated class, or any other information DOE considers relevant, the Department will propose an amendment to the final rule to include those levels DOE believes are technologically feasible and economically justified.

1.3.4 Method of Specifying Energy Efficiency Levels. For refrigerators and refrigerator-freezers, freezers, clothes dryers, kitchen ranges and ovens, and water heaters, it was found that the efficiency levels within any class vary with capacity (i.e., net volume). Therefore, within a single class, basic models differing according to capacity are to be subject to different energy efficiency levels. This method of establishing energy efficiency levels is designed to achieve improvements in production efficiency in all capacity sizes proportionally equal and not to penalize certain basic models that have efficiency differences due to variation in capacity or volume. For furnaces, central air conditioners, and room air conditioners, the analysis indicates that efficiency levels do not vary with capacity. Therefore, energy efficiency levels can be set at the same level within each class. The "Engineering Analysis," TSD No. 5, contains a more detailed explanation of the rationale for variable standards by capacity.

1.3.5 Planned Phase-In of Standards. Section 325(c) of the Act allows for a phasing-in of the standards over a period not in excess of 5 years through the establishment of intermediate standards. Use of the full 5 year period provides manufacturers with more planning and development time, to meet final standards than otherwise would be proposed if a shorter period was adopted.

Accordingly, DOE plans to utilize the full phase-in period and has proposed final standards which are to be achieved by January 1, 1986. Intermediate standards proposed for the subject consumer products are to be effective 180 days after the rule is published in the **Federal Register.** The intermediate standards take into account the short lead time manufacturers have in order to make design changes and the possibility of products being eliminated from the market place. DOE is proposing intermediate standards which it believes are technologically feasible and economically justified.

2. Definitions

For purposes of this notice, the following terms are defined:

"Basic model" of covered product means all units of a given type of covered product (or class thereof) manufactured by one manufacturer which have the same primary energy source (gas, oil or electricity), the same capacity, and which do not have any physical or functional differences that affect energy consumption, measured in accordance with the DOE test procedure.

"Certification" means all actions available to DOE or required of a manufacturer or private labeler prior to or immediately after the beginning of commercial distribution to ensure that all covered products not meeting the applicable energy efficiency standards are withheld from distribution.

"Enforcement" means all activities subsequent to certification, available to DOE or required of a manufacturer or private labeler to ensure that all covered products not meeting applicable energy efficiency standards are withheld from distribution.

"Maximum technologically feasible energy efficiency level" means, for each class of covered product, the highest level of the measure of energy efficiency (energy factor, annual fuel utilization efficiency, energy efficiency ratio, or seasonal energy efficiency ratio as defined and measured according to DOE test procedures) of any basic model for each class that DOE expects to be commercially available at the time of the effective date of the final standard.

"Minimum energy efficiency level" (MEEL) means the minimum value of the measure of efficiency (energy factor, energy efficiency ratio, seasonal energy efficiency ratio, annual fuel utilization efficiency), specified in 10 CFR Part 430, Subpart C, and measured according to DOE test procedures in Subpart B, which a covered product must meet or exceed in accordance with Subpart F in order to be in compliance with an energy efficiency standard.

3. Advance Notice

3.1 Discussion of Industry Data

In order to obtain information on the consumer product industry suitable for determining probable impacts of energy efficiency standards, the following sources were used: 1) publicly available information (Moody's, Standard & Poor, Census of Manufacturers' Directory, etc.), 2) a survey of all firms identified as consumer product manufacturers (Form CS–179), 3) a survey of a sample of firms in the industry (Form CS–195) which were made available at the DOE *Freedom of Information Office.* Information solicited from the industry was provided on a voluntary basis and, as discussed below, was often of a proprietary nature.

The information provided background on shipment levels, the overall business climate of the industry, and new product offerings. Also included was information maintained by various credit/financial reporting companies on the finances of publicly owned firms (corporations). This information has been incorporated directly into the financial analysis of regulatory impacts.

In order to obtain information on product efficiency, number of units shipped, capital investment, and suggested retail price, a survey of all identified consumer product manufacturers was conducted. The survey instrument was Form CS–179, a copy of which appears as Appendix C of the "Economic Analysis Document," TSD No. 4. Responses were made available to DOE in aggregated form by the trade associations in order to protect the confidential information gathered via this survey. The results of the survey were used to determine the potential impact of alternative standard levels on manufacturers by determining the number of models potentially falling below various efficiency levels. Models falling below specified levels represent lost sales and lost revenues to the firms producing them and are thus used (with other data) in assessing the size of the impact. Additional data solicited under Form CS–179 concerned design options and the adequacy of the class definitions proposed by DOE.

The trade associations provided aggregated data on the relationship between retail price and energy efficiency (and, where appropriate, capacity). This information was used in analyzing the effect regulations would have on price and quantities shipped.

In developing an economic model which incorportes the business practices of the industry, additional information was solicited from selected representative firms via Form CS–195, a copy of which appears as Appendix D of the "Economic Analysis Document," TSD No. 4. This survey was provided to all firms who identified themselves as consumer product manufacturers and were willing to submit the requested data. This survey gathered information on normal practices in accounting, financing, decision making, and other information practices relevant to a firm's decision to remain in or withdraw from the market. The results of this survey were incorporated into the economic models used in analyzing impacts on manufacturers and are available in the "Economic Analysis Document," TSD No. 4.

The financial/economic models, developed in part from Form CS–195, were used to assess impacts on manufacturers. In particular, the models were used to determine the number of firms forced to leave the market place, effects on profits, changes in debt and asset levels, and how market shares would be reapportioned as the result of the exit of firms from the market place.

Finally, manufacturers were asked to comment on and provide additional data for selected draft reports. Chief among these was the report on the costs required to achieve various energy efficiency levels. Because these costs were used in evaluating direct impacts on manufacturers and in assessing consumer price increases, every effort was made to ensure their accuracy. Accordingly, the costs represented in the final version of this report were the product of substantial consultation with industry.

3.2 Comments Received in Response to Advance Notice

3.2.1 Engineering.

Product Classification

Nearly all manufacturers and their trade associations addressed this issue and, in almost all cases, they felt that the number of classifications of the products should be expanded. The request for expanded classifications covered most covered products but particularly furnaces and boilers, kitchen ranges and ovens, water heaters, room air conditioners, and refrigerators. Several manufacturers expressed the opinion that their products require separate classifications or, in some cases, should be exempt completely from the standards. DOE has reviewed these comments and made appropriate revisions based upon the comments received and criteria identified in Section 4 of this notice.

Phase-In of Standards

Many manufacturers addressed the issue of interim efficiency standards. In particular, manufacturers of furnaces and boilers expressed the desire to have no interim standards as the testing and approvals required for each modification would be a major task. Several manufacturers suggested that standards become effective at different times for different products to spread the testing requirements. There was a general desire to know as early as possible what the final standard would be to provide as much time as possible to meet that standard. Twenty-four comments suggested three standard levels (1981, 1983, and 1985) would be a burden on industry because of the 3- to 5-year lead time for introducing new models. While the majority of the comments recommended standards for 1981 and 1985, two comments recommended 1983 and 1985, and four comments recommended only 1985 standards. Also, three comments recommended that no standards be set for water heaters as 47 states have adopted ASHRAE Standard 90–75 which includes standards for water heaters that approach the state-of-the-art technology. Based upon its analysis of these comments, DOE is proposing intermediate (1981) and final (1986) energy efficiency standards.

Energy Efficiency Standards

Various comments recommended that the standards should vary with capacity for clothes dryers, refrigerators and refrigerator-freezers, water heaters, central air conditioners and conventional ovens because efficiency is directly related to the capacity or volume of the product. Manufacturers generally seemed to prefer increasing the number of product classes to handle the variation of efficiency with capacity. DOE is today proposing energy efficiency standards that vary with capacity for clothes dryers, refrigerators and refrigerator-freezers, freezers, kitchen ranges and ovens, and water heaters.

A number of comments urged that the energy efficiency improvement target levels (43 FR 47118 and 43 FR 15138) be used to establish 1985 standards for furnaces, room air conditioners, central air conditioners, refrigerators and refrigerator-freezers. In lieu of this approach, DOE is today proposing energy efficiency standards which represent the maximum improvement in energy efficiency which is technologically feasible and economically justified as required by the Act.

A number of comments urged that the standard levels recognize product variability, manufacturers' tolerances, and test variability and that the standard should be applied to the mean value of efficiency of each basic model rather than a level every unit must meet. However, one comment recommended the standard be applied to the mean value of efficiency of a manufacturers' total distribution of each class of product, allowing the manufacturer to continue to offer a complete product line. DOE is today proposing standards to be applied to each basic model of a type of covered product (or class thereof).

While a number of comments suggested specific levels to be considered for standards, one comment recommended that standards for central air conditioners in 1981 be set no higher than the 1975 product sales-weighted efficiency level. Two comments suggested that standards should not be set higher than the levels in effect in the State of California, while one comment urged that the standards be set no lower than the California levels. Finally, the comments suggested that standards which have more than a 3- to 5-year payback would be unacceptable to consumers. After reviewing all relevant

comments, DOE is today proposing standards which will achieve the maximum improvement in efficiency which is technologically and economically feasible.

Test Procedures

Concerns over the test procedures generally related to the fact that the performance aspects of many product features, such as microwave oven browning elements and automatic termination on clothes dryers are not adequately recognized. Amendments to the test procedures for clothes dryers have been proposed to include the performance aspects of automatic termination devices and the standards proposed today are based upon the proposed amended test procedures. Also, no standard is being proposed for microwave ovens.

Product Elimination

Several comments expressed concern that the standard might be set at levels sufficiently high to force certain products from the market place. These may be significant products for the replacement market (horizontal furnaces) or contain features which have a utility to the user (refrigerator-freezer with through-the-door services). Even though certain basic models may be eliminated, DOE has specified separate classes to ensure the availability of features providing utility when the feature causes the energy efficiency of the models with the feature to be different from that of models without the feature.

Maximum Technologically Feasible

A number of manufacturers believe that maximum technologically feasible designs should not be based upon models manufactured by companies who have gone out of business, limited volume trial models of uncertain commercialization, and models representing an extremely small percentage of class model mix. Further, they believe only models that have been commercially available for at least 3 years should be considered technically feasible. The numerical value given in the advance notice for standards for home heating equipment not including furnaces, freezers, and room air conditioners were claimed to be too high. After review, DOE today has identified the maximum technologically feasible energy efficiency level for each class of covered product to be the highest level of efficiency for each class that DOE expects to be commercially available at the time of the effective date of the final standard.

3.2.2 Economics.

Impacts

Comments on economic impacts were varied and came mainly from manufacturers. Points raised included: the need to address product maintenance costs in economic justification; the difficulty and cost of providing economic data; and the product development and testing costs for small companies. DOE has taken all these factors into account along with other major factors as detailed in the "Economic Analysis Document," TSD No. 4.

Payback

One manufacturer suggested that the payback period for the increased first costs through reduced energy costs should be 2 to 3 years and, in no case, more than 5 years. The standards proposed today have paybacks which are on the order of five years or less, and are derived from life cycle cost analysis discussed in the "Economic Analysis Document", TSD No. 4

3.2.3 Consumer Education.

A few manufacturers suggested that a consumer education campaign that recommends efficient methods of operation of existing appliances may achieve greater energy conservation in a shorter time period than will energy efficiency standards. It was also suggested that the educational phase of the energy efficiency standards program should coincide with the introduction of labels and energy fact sheets. DOE has developed a consumer education program to complement the energy labeling program. The consumer product education labeling program sponsored 10 regional workshops for industry, educators, utilities, and State energy officials in the Fall of 1979. A national consumer awareness campaign began last month to inform consumers of the appearance of the consumer product labels and how to use labeling information in the purchase of energy efficient products. A consumer information booklet, public service announcements for radio and TV, educational exhibits and a training package for retail sales persons are among the components of this nationwide effort.

3.2.4 Other.

Sampling Procedures

Two trade associations commented that sampling procedures will affect the energy efficiency level which can be met. A number of different sampling procedures were suggested. DOE has considered the proposed sampling procedures in developing the certification and enforcement program. The proposed approach, "Mixed Certification and Enforcement Approach" and alternatives considered are described in section 6 of this notice.

Patent Infringement

One manufacturer stated that energy efficiency standards should not be based on a product that is covered by patents. In particular, the manufacturer cites patents involving the convection oven. DOE has studied the problem of patent infringement and has determined that achieving today's proposed standards does not infringe any existing patents. The Department is proposing performance standards, thus allowing the manufacturer product design flexibility. Information available to DOE indicates that of the design options considered, none have proprietary patent protection.

Preemption

Two major manufacturers called for clarification of the timing of the preemption clause. Their preferred interpretation was that once the Federal standard is prescribed for a given product an existing State standard is automatically and immediately preempted. The State preemption process proposed today is discussed in section 7 of this notice.

Product Exemption

A number of manufacturers and a trade association favored the exemption from energy efficiency standards of various products including kitchen ranges and ovens, clothes dryers, space heaters, and packaged terminal air conditioners based on the grounds that there is little difference in energy consumption between different models. No standards are proposed today for those classes for which standards are not economically justified.

Labeling

Commenters addressing this subject suggested that labeling would not be necessary when energy standards are established. Concern was expressed over the complications of energy labeling, particularly for water heaters because of different utility rate structures and use habits. DOE has determined that labeling alone will not satisfy the mandate of the Act. For further discussion on the impacts of labeling on energy savings the reader is referred to the "Economic Analysis Document" TSD No. 4.

Enforcement

Trade associations suggested that current industry certification programs should be used wherever possible and

that a common enforcement program should be used for the labeling and energy efficiency standards programs. It was suggested that in cases where data is in question a manufacturer should be allowed to verify his own tests first, followed by testing by an independent laboratory, if necessary, and that testing by DOE should be used only as a last resort. DOE has reviewed these comments and is today proposing an enforcement approach which is discussed in detail in section 6 of today's notice.

4. Determination of Energy Efficiency Levels

4.0 Methodology

Impact Assessment of Standards

In order to assess the benefits and impacts of setting standards for energy efficiencies at different levels based on the seven criteria specified in section 325(d) of the Act, engineering and economic analyses were completed for each covered product and the results are summarized within this section. As part of this analysis, the relationship between the increased cost of a consumer product and its efficiency improvement was estimated for each product class. Estimates were also made of the maximum technologically feasible energy efficiency levels for 1986. In addition, estimates of the investment required by a typical large and small manufacturer were made. Estimates by product class of the changes in manufacturing materials needed were made to provide estimates of materials availability for the different alternate efficiency levels. Cost-efficiency relationships were used to estimate national energy savings through the year 2005 considering changes in purchases of consumer products. An estimate of industry impacts was developed using data from industry surveys and the cost efficiency curves. Finally, environmental impacts and enforcement costs were evaluated. The proposed standards were set at the highest levels technically feasible and economically justified considering these impacts.

Determination of Classes

An initial task in the development of standards was the establishment of classes for each of the nine covered products. The first step was to divide the various models within each covered product into classes according to the type of fuel used, as mandated by the Act. Although efficiencies of higher values are always better, relative efficiencies across fuel types in a covered product are not comparable because point of use energy is considered in all cases rather than primary energy source. The second step was to further segregate each covered product into classes each of which was distinguished by capacity or a performance-related feature which affects energy efficiency but provides utility to the consumer. Performance of a consumer product is the objective measure of how well the product does its intended job. Measures of performance include capacity and quality. Quality is a measure of the consistency, uniformity or thoroughness with which the product does its job. Utility of a consumer product is a subjective measure, based on the consumer's perception of the capability of the product to satisfy user needs.

Next, an investigation of the inherent energy efficiency of each class was performed to determine if different energy efficiency levels were needed for each of the classes. Only those classes which used a different type of fuel or which had an energy efficiency inherently different from similar classes were identified in the proposed rule.

Test Procedures

Measurements of efficiency which are derived from the test procedures are used as the basis for energy efficiency standards. Manufacturers are required to establish that their products are in conformance with the standards by testing in accordance with these test procedures.

Cost-Efficiency Relationships

Major assumptions in developing manufacturing cost relationships associated with energy efficiency improvements for the 1986 standards were:

- production volumes were assumed to remain constant within each product class;
- design options selected for analysis were based on technologies which are currently available or have been demonstrated to be feasible;
- only design options which are measurable by existing DOE test procedures were considered; and
- lead times for implementing design changes required to meet the energy efficiency levels were long enough so that no significant increase in engineering staff were likely to be required.

The engineering analysis involved three primary steps. First, for each product class, the facilities of a typical large and small manufacturer were characterized in terms of production volumes and production line layouts including capital equipment. Second, for each product class, a baseline unit representative of products at the 1978 shipment weighted energy factor was selected and estimates were made of the energy efficiency improvements which would result from implementing various design options. Finally, two estimates were made—the added cost at the manufacturing level, and the cost to a consumer of achieving different efficiency levels. These steps are described in more detail below.

In order to characterize manufacturers of each product class, a simulated manufacturing facility for a typical large and small manufacturer and the number of large and small manufacturers were estimated so that the total shipments per year would be equal to the original shipment estimate. The facilities were further characterized in terms of manufacturing equipment and production track layout required for the production of the units. A more detailed presentation of the manufacturing cost analysis can be found in the "Engineering Analysis Document," TSD No. 5.

Design Options

The design option analysis began with the selection of a baseline unit. The selection was based on data obtained from Form CS–179, a survey of all identified consumer product manufacturers. The baseline unit was defined as the unit with an efficiency, input, output, and size approximately equal to that of the most commonly produced unit in 1978. For the analysis of the various design options each baseline unit was characterized in terms of its features which relate to efficiency.

Various combinations of manufacturing design options and their potential for energy savings were identified. The following philosophy was applied to the selection of specific design options:

(1) Improvements must have a payback to the consumer of less than the product's life.

(2) Design options to the manufacturer with the shortest lead time and most cost effective improvements were selected to achieve each efficiency level analyzed.

Various other methodologies (series of design improvements) to higher efficiency can be envisioned. For instance, the lowest cost to the consumer to achieve each efficiency level could have been assessed. This could lead to a rearrangement of the design improvements to achieve the level. However, minimizing lead time within the payback criterion, was felt to be the most effective and likely scenario

for introducing energy savings at the earliest possible date.

Using engineering analysis and computer simulations, the efficiency improvements which would result from implementing various design options were estimated. The design options considered were limited to those based on "available" technology, defined as those technologies presently implemented in units available in the marketplace. Only those design options were considered which were covered by existing test procedures (final and proposed). These design options are described in detail in the "Engineering Analysis Document," TSD No. 5 for each covered product. The design option analysis provides estimates of the per unit change in materials and purchased parts required to achieve specific efficiency levels.

Cost Elements

Four basic cost elements (investment, materials, purchased components, and labor) were considered. Investment included capital equipment, plant, tooling, allowance for costs related to inventory, spare parts, and reissuing product literature. Per unit costs were estimated by amortizing these investment costs using the yearly production volume and depreciation periods of 30 years for plant, 10 years for capital equipment, and 3 years for tooling and miscellaneous costs. Material costs per unit were estimated by using the material costs per pound with the estimated changes in materials made during the design option analysis. Purchased component costs per unit were based on quotes from suppliers. Although some larger manufacturers might make components such as compressors or vent dampers, these items were costed as purchased parts unless the majority of manufacturers produced them in-house. Labor costs were obtained by estimating the change in labor in minutes for each design option and using a labor rate of $17.34 per hour (direct cost plus burden). These four cost elements were summed to estimate the added factory cost.

Price Mark-Ups

Estimates of the added cost to the consumer were made by marking up the factory cost by 35% to obtain an estimate of the cost to a wholesaler-distributor. The wholesaler-distributor cost was finally marked up by 60% for water heaters, furnaces, and central air conditioners and 70% for refrigerators and refrigerator-freezers, freezers, clothes dryers, kitchen ranges and ovens, and room air conditioners to obtain the estimated added cost to the consumer. To estimate the price of a more efficient unit to the consumer, this estimated cost increase was added to the price of the baseline unit. This price and the efficiency of the unit were then used to generate a cost vs. efficiency relationship for each product class.

Maximum Technologically Feasible

DOE believes that for 1986, product designs in prototype form January 1980 represent the maximum technologically feasible products. Although there will be advances in development beyond some of these levels over the next 6 years, DOE believes that these developments could not be demonstrated as technologically feasible in that the long lead times would not allow such products to be introduced into the market by 1986.

Even though manufacturers have prototypes in the January 1980 time frame, it is not practical to expect a complete product line transformation considering product development cycle of engineering, prototype fabrication, laboratory testing, field testing, production engineering and production facility modification. As a result it is not realistic to expect that in 1986 the manufacturer would be able to produce only those products whose energy efficiency is equal to or greater than the maximum technologically feasible. Consequently, DOE has determined that it is not economically justifiable to propose energy efficiency standards at the maximum technological limit.

Life Cycle Costs and Payback Analysis

Two key criteria for assessing impacts on consumers resulting from standards are life cycle costs and payback period. Life cycle cost is a measure of the discounted total cost of consumer product ownership. Included is the total purchase price, energy use over the life of the product, and the maintenance costs over the service life of the product, discounted to their present values. The consumer payback period represents the time required to recoup the increased purchase price of more energy efficient products through reduced energy bills. Decreases in product life cycle costs represent the net benefit to consumers while the consumer payback period gives an indication of the time it takes to overcome the initial burden of higher product prices.

Financial Impact Analysis

The financial impact analysis of manufacturers centers on projected changes in profit to net worth ratios and the ability of firms of different sizes to finance the capital investment necessary to meet 1986 standards. The analysis shows that small firms may experience greater difficulty in meeting standards than their larger competitors. The methodology underlying this analysis is as follows.

For the consumer product types subject to proposed standards, 292 manufacturers have been identified. Of these, financial data were available on 146 firms. These data were obtained primarily from public sources such as Dun & Bradstreet. Privately held firms, many of whom are small manufacturers, are underrepresented in the data base because financial information is not generally made available to the public. DOE requests manufacturers to submit additional financial data to expand the information available for financial impact analysis.

For the years 1973 through 1978, data were compiled on assets, liabilities, cost of goods sold, fixed costs and earnings for each firm. The data were not available by product type so it was necessary to break down aggregated data by line of business for diversified firms. The 146 firms were first rank ordered by their total sales. Large firms are defined as the largest 20 percent of the 146 firms, medium firms are the next 20 percent, and small firms are the remaining 60 percent.

Data analyses indicated that large manufacturers represent approximately 92 percent of total sales, medium firms 6.8 percent, and small firms, 1.2 percent. These percentages, along with estimates of total industry sales by product types, were used to disaggregate product type sales in 1978 into market shares for each of the 146 firms in the data base. In this way, estimated income and balance sheet data were derived for 146 firms for 1978 on a product type basis. These financial data were used to develop probability distributions around expected earnings for each product-type for small, medium and large firms.

This procedure was used only after exhausting other potential sources of accounting data on each of the 146 firms. The industry, through the trade associations, was requested to provide detailed delineated financial data. Each such request was denied. DOE will continue in its attempts to obtain this information during the time between issuance of this proposed rule and promulgation of the final rule.

The financial impact analysis was generalized to small, medium and large representative firms for each product type. These representative firms were taken to have the mean financial values of all firms in the respective size category. Industry sales were projected for these firms as described in TSD No. 4. Investment requirements to meet

standards, as described in TSD No. 5, were added to fixed costs. The resulting change in earnings for each representative firm was calculated for the 1981 through 1988 time frame.

From the above analysis, expected average earnings were calculated for each size of representative firm for each product type. These average earnings were applied to the industry probability distributions described above in order to determine the projected industry distribution of earnings for each size of firm producing each of the eight product types. Manufacturers were assumed to be able to make the necessary capital investment for 1986 standards if they could do so out of retained earnings during the 1981 through 1985 time frame. Furthermore, they were assumed to be able to make this investment out of a combination of retained earnings and loans if any indebtedness could be paid back out of retained earnings over the 1986 through 1988 time frame.

Expected impacts of proposed standards on small, medium and large manufacturers are presented in their respective economic sections of this preamble. Impacts on the industry refer to the percentage of industry sales capacity having a high probability of successfully financing capital investment. Impacts on small, medium and large firms refer to that percentage of firms which are expected to successfully meet 1986 standards, as reflected in the probability distribution of forecasted earnings.

It should be recognized that manufacturers have flexibility for creative financing, creative production approaches and cost reduction. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. This flexibility will result in a greater success rate in meeting standards than that indicated by the conservative financial analysis presented here.

However, it is impossible to know in advance the full extent of this flexibility for all firms in the industry. Therefore, the percentage of firms identified as having low probabilities of success, using the conservative assumptions of the financial analysis, probably reflect a higher level of industry impact than will likely occur.

The financial impact analysis, even given its conservative assumptions, showed that the industry capacity estimated to be maintained after standards are imposed ranges from 75 percent for freezer manufacturers to nearly 100 percent for furnace manufacturers. Furthermore, sufficient production will be available for every consumer product class to meet consumer demand. The analysis indicates a low probability of successful financing for small manufacturers of all products except furnaces, central air conditioners and clothes dryers. However, given the conservative assumptions concerning manufacturer flexibility, the expected low impact on overall industry capacity and the potential for a 2-year exemption for firms under $8 million, the estimated level of manufacturer impact is not expected to be excessive when compared with the energy savings and net benefit to consumers discussed elsewhere in this preamble.

Of the 292 individual firms and major plants comprising the industry, the number of firms producing the different product types is as follows: refrigerator and refrigerator-freezers, 23; freezers, 18; ranges and ovens, 27; water heaters, 33; room air conditioners, 42; central air conditioners, 58; furnaces, 85; and clothes dryers, 17. These firms have combined consumer product factory sales of approximately $6 billion.

Impacts on Small Manufacturers Eligible for Exemption

Approximately 80 firms, or 27 percent of the industry, have individual gross sales from their overall operation of $8 million or less and therefore are eligible upon petition for a 2-year exemption from standards. These firms account for less than one percent of the total production of the eight consumer products. If granted exemptions, 60 firms, or 75 percent of manufacturers with sales less than $8 million, are expected to be able to meet the proposed standards. They may be able to capture a greater share of the low-priced market in 1981–1983 and may have proportionately higher profits than their larger competitors who must comply earlier with the standards.

Proposed standards for 1981 were set in order to allow the overall industry sufficient earnings to make the necessary changes for meeting proposed 1986 standards. However, small manufacturers will have greater difficulty meeting 1986 standards than their large counterparts due to their smaller earnings. The exemption of small firms with sales under $8 million are expected to mitigate this greater burden by allowing 2 years of proportionately higher earnings and a greater lead time for production changes.

4.1 Refrigerators and Refrigerator-Freezers

4.1.1 Summary. "Electric refrigerator" means a cabinet designed for the refrigerated storage of food at temperatures above 32°, and having a source of refrigeration requiring an electrical energy input only. It may include a compartment for the freezing and storage of food at temperatures below 32°F, but does not provide a separate low temperature compartment designed for the freezing of and the long term storage of food at temperatures below 8°F. It has only one exterior door, but it may have interior doors or compartments.

"Electric refrigerator-freezer" means a cabinet which consists of two or more compartments with at least one of the compartments designed for the refrigerated storage of foods at temperatures above 32°F and with at least one of the compartments designed for the freezing of and the storage of frozen foods at temperatures of 8°F or below and may be capable of being adjusted by the user of a temperature of 0°F or below. The source of refrigeration requires an electrical energy input only.

The proposed energy efficiency levels for refrigerators and refrigerator-freezers are found in Table 4.1–1. Table 4.1–2 presents the alternative efficiency levels selected for analysis for 1981 and 1986.

4.1–1 Energy Efficiency Levels for Refrigerators and Refrigerator-Freezers (Energy Factor, EF, $ft^3/kWh/24$ hrs).

Product class	July 15, 1981	January 1, 1986
1. Electric refrigerator; manual defrost.	1.20 + 0.524V	11.04 + 0.474V
2. Electric refrigerator-freezer; manual defrost freezer.	0.06 + 0.400V	6.29 + 0.432V
3. Electric refrigerator-freezer; automatic defrost with top freezer.	1.69 + 0.178V	4.91 + 0.183V
4. Electric refrigerator-freezer; automatic defrost with side freezer.	3.19 + 0.09V	5.20 + 0.082V
5. Electric refrigerator-freezer; automatic defrost with bottom freezer.	4.5	8.1
6. Electric refrigerator-freezer; automatic defrost with top freezer and through-the-door ice or liquid service.	5.4	7.4
7. Electric refrigerator-freezer; automatic defrost with side freezer and through-the-door ice or liquid service.	4.7	6.3

V = Total Unadjusted Volume, expressed in ft^3.

Note.—See rationale for variable standards in section 4.1.2.

Table 4.1-2—*Alternate Efficiency Levels (Energy Factor, EF, ft³/kWh/24 hrs)*

Product class	Level	1	2	3	4
1. Electric refrigerator, manual defrost	1981	0.42+0.524V	1.20+0.524V	1.98+0.524V	2.76+0.524V
	1986	2.44+0.474V	3.84+0.474V	11.04+0.474V	.....
2. Electric refrigerator-freezer, manual defrost freezer.	1981	−0.52+0.400V	0.06+0.400V	0.65+0.400V	1.24+0.400V
	1986	0.69+0.432V	2.89+0.432V	6.29+0.432V	.....
3. Electric refrigerator-freezer, automatic defrost with top freezer.	1981	1.16+0.178V	1.69+0.178V	2.21+0.178V	2.73+0.178V
	1986	2.01+0.183V	3.71+0.183V	4.91+0.183V	.....
4. Electric refrigerator-freezer, automatic defrost with side freezer.	1981	2.84+0.09V	3.19+0.09V	3.54+0.09V	3.89+0.09V
	1986	4.20+0.082V	4.70+0.082V	5.20+0.082V	.....
5. Electric refrigerator-freezer, automatic defrost with bottom freezer.	1981	4.2	4.5	4.9	5.2
	1986	6.4	6.9	7.4	.....
6. Electric refrigerator-freezer, automatic defrost with top freezer and through-the-door ice or liquid service.	1981	5.0	5.3	5.7	6.1
	1986	4.8	6.5	7.7	.....
7. Electric refrigerator-freezer, automatic defrost with side freezer and through-the-door ice or liquid service.	1981	4.8	5.0	5.3	5.6
	1986	5.5	6.0	6.3	.....

V = Total unadjusted volume, expressed in ft³.

The levels selected for analysis for 1981 are derived from the 1978 shipment weighted energy factor (SWEF)—which is the summation of number of units of a particular basic model multiplied by the energy factor, divided by the total number of shipments within a class—for each class of refrigerators and refrigerator-freezers. Level 2 in 1981 corresponds to the SWEF in 1978. Level 1 is one standard deviation below the SWEF, while Level 3 and Level 4 are 1 and 2 standard deviations above the SWEF, respectively. The standard deviation of measured energy factors is used to define final levels because of the differences in distribution and definition of energy factors among product types and classes. Use of this statistical measure assures that the potential relative impacts of similar trial standard levels are the same for different classes. The levels selected for analysis for 1986 are derived from a manufacturing cost estimating technique used to estimate materials, investment and engineering costs required to market products of higher efficiencies in the 1986 time frame. Level 3 in 1986 corresponds to the maximum level which is technologically feasible and economically justified. A detailed explanation on the technological feasibility and economic justifiability can be found in the Engineering Analysis and Economic Analysis Documents, TSD No. 4 and No. 5, respectively. Levels 1 and 2 correspond to proportionally lower levels which have fewer design improvements required and correspond to lower first cost and generally higher life cycle costs. Level 4 corresponds to an advance technology case which incorporates design options not on the market place in any great quantity or only in prototype stages at this time.

The rationale for selecting the proposed levels appears in sections 4.1.2 and 4.1.3.

4.1.2 Engineering Analysis

Methodology

In performing the product efficiency analysis, the key design improvements for the cabinet and the refrigeration system considered were:

- substitution of polyurethane foam for fiberglass;
- double door gaskets and reduced throat clearance;
- improve compressor motor; and
- removal of evaporator fan motor from refrigerated space.

A computer model integrating cabinet design and refrigeration system subroutines was used to determine the performance of the improved designs. The computer model has been verified by comparing predicted results to the actual test results of a number of production and prototype refrigerator-freezer designs. A technical discussion of the computer model is contained in the "Engineering Analysis Document," TSD No. 5.

The manufacturing cost analysis assumed a facility consisting of seven manufacturing production lines for a large manufacturer and five for a small manufacturer. It was assumed that the product lines shared production lines of cabinet doors and compressors were purchased from other manufacturers.

Cabinet equipment suitable for polyurethane foam substitution was identified and costs determined. Tooling changes for outer cabinet and liner changes to accommodate foam substitution were costed. Tooling changes for mounting new purchased parts and other cabinet alterations were evaluated. Some plant costs were identified in conjunction with the additional space required for the foaming equipment.

Increased costs, per unit of foam material, were assessed and the increase in labor was estimated. Parts which must be purchased for compressor improvement, evaporator fan improvement, double freezer gasket and anti-sweat heater switch were all estimated for each efficiency level. These were combined with per unit investment costs to obtain estimates of the total added cost to achieve each efficiency level evaluated. These cost-efficiency relationships are explained in more detail in the "Engineering Analysis Document," TSD No. 5.

Maximum technologically feasible energy efficiency levels were developed using advanced technologies. For the automatic defrosting units, a forced convection standard evaporator in the freezer was used in series with a free convection passive defrosting heat exchanger in the fresh food compartment. Improved refrigeration system efficiency and reduced defrost requirements resulted. Insulaton thickness was optimized to achieve maximum internal storage volume with minimum heat gain. This included increased door insulation as well as a redistribution of insulation throughout the entire cabinet. Improved air system flow paths were employed to reduce the power necessary to operate the fan.

Maximum technologically feasible levels for the electric refrigerator-freezer; manual defrost freezer and electric refrigerator; manual defrost were achieved by increasing insulation thickness in the door and increasing heat transfer surface areas of the evaporator and condenser in addition to the use of available technology design options. These levels have not been proposed as the energy efficiency standard because of the present requirement for economic justifiability discussed in the "Economic Analysis Document," TSD No. 4.

The maximum technologically feasible levels for 1986 for refrigerators and refrigerator-freezers are shown in Table 4.1–3.

4.1–3 Maximum Technologically Feasible Levels for Refrigerators and Refrigerator-Freezers (Energy Factor, EF, ft³/kWh/24 hrs).

Product class	Level
1. Electric refrigerator; manual defrost	16 + .474V
2. Electric refrigerator-freezer; manual defrost freezer	11.9 + .432V
3. Electric refrigerator-freezer; automatic defrost with top freezer	7.1 + .183V
4. Electric refrigerator-freezer; automatic defrost with side freezer	8.62 + .090V
5. Electric refrigerator-freezer; automatic defrost with bottom freezer	9.7
6. Electric refrigerator-freezer; automatic defrost with top freezer and through-the-door ice or liquid service	8.9
7. Electric refrigerator-freezer; automatic defrost with side freezer and through-the-door ice or liquid service	8.9

V = Total Unadjusted Volume, expressed in ft³.

Test Procedures

The test procedures for refrigerators and refrigerator-freezers found at 10 CFR Part 430, Subpart B, provide a standardized method for calculating the efficiency (energy factor, EF) of refrigerators and refrigerator-freezers by measuring the adjusted refrigerators volume and the electrical energy consumption in a 24-hour period. The adjusted volume is calculated by adding the fresh food compartment volume to the product of the freezer compartment volume and an adjustment factor which accounts for the increased heat transfer into the freezer due to the large temperature difference across the freezer compartment walls. Energy factors have dimensions of cubic feet per kilowatt hour per 24 hours (ft^3/kWh/24 hrs) and are useful indicators of refrigerator and refrigerator-freezer efficiency since they facilitate comparison of energy consumption between units of different total volumes and with different ratios of fresh food to frozen food compartment volumes.

DOE received a comment in response to the advance notice that addressed the refrigerator and refrigerator-freezer test procedures. The commenter objected to the allowance of usage credit for designs which have switches to turn off anti-sweat heaters. When operating, these heaters provide localized heat to prevent condensation of moisture on certain exterior surfaces of these products when used in high humidity environments. The commenter maintained that these credits discourage design improvements which utilize improved insulation to prevent such condensation. Based on actual field test data, DOE maintains that the credits provided for this feature are appropriate and necessary and therefore has made no changes pursuant to this comment.

It was suggested that a 50 percent credit be given for each class and size category based upon the particular design which requires the least amount of anti-sweat heater energy. NBS and DOE have carefully analyzed this suggestion. The commenter assumed that the most efficient designs are those which have small differences in energy consumption when the anti-sweat switch is moved from the high energy consumption position to the low energy consumption position. This assumption is not necessarily true since switches in certain inefficient designs may not turn off all of the anti-sweat heaters and, consequently, the difference in power consumption for some inefficient designs may also be small. Consequently, changes in the test procedures to accommodate this commenter's suggestions have not been made.

DOE, in response to a petition for rulemaking, has proposed an amendment to the test procedures for refrigerators and refrigerator-freezers to reduce testing time and burden on manufacturers. The existing test procedures for single-control refrigerators and refrigerator-freezers require testing at three control settings and for multiple-control refrigerator-freezers at four control settings with a load (thermal mass) in the freezer. The proposed test procedures require testing at only two control settings and does not require a load in the freezer of automatic defrost units.

The proposed test procedures are expected to reduce testing time and burden by more than one-third. NBS experimentation has determined that energy consumption and energy factors measured via the proposed test procedures will be essentially identical to those determined according to the existing procedures. Consequently, revision of the test procedures for refrigerators and refrigerator-freezers will not affect previous test results or the levels of energy efficiency standards proposed by this notice.

Individual Product Class Analysis

Five comments received in response to the advance notice criticized DOE's establishment of only three classes of refrigerators and refrigerator-freezers. These commenters stated fundamental physical reasons for the establishment of additional classes of automatic-defrost refrigerator-freezers. DOE and NBS carefully analyzed these comments and, consequently, seven classes of electric refrigerators and refrigerator-freezers are proposed in section 4.1.1 of this notice. These classes are distinguished by performance-related features which affect both efficiency and utility of the unit. These features are: (1) type of freezer defrost system (manual or automatic), (2) freezer compartment temperature, (3) physical arrangement of compartments, and (4) availability of through-the-door service features.

As defined in the DOE test procedures, refrigerators are refrigeration products with a compartment for refrigerated storage of food at temperatures above 32°F which may have a compartment for the frozen storage of food at temperatures below 32°F and above 8°F. Refrigerator-freezers are refrigeration products with compartments for refrigerated storage of food at temperatures above 32°F and a compartment for frozen food storage at temperatures below 8°F. Since frozen food can be stored for longer periods of time at temperatures below 8°F than at temperatures above 8°F, DOE has concluded that the lower freezer compartment temperature provides additional utility to the consumer. Also, since lowering the freezer temperature increases heat leakage into the freezer and increases energy consumption of the refrigeration system, DOE has grouped refrigerators and refrigerator-freezers into separate classes.

DOE has determined that automatic defrost refrigeration products, those which do not require any action by the user to accomplish defrosting of the freezer, provide utility to the consumer. Automatic defrost products consume additional energy first, to melt the frost when performing a defrost cycle and, second, to remove the defrost heat from the cabinet in order to maintain compartment temperatures. Consequently, DOE has grouped automatic defrost and manual defrost units separately.

Automatic defrost refrigeration products have been segregated according to the location of the freezer compartments. DOE has determined that products with bottom or side freezers provide different utility to consumers than do units with top freezers.

Automatic defrost refrigerator-freezers with side freezers provide utility to consumers because of the opportunity for users to more conveniently locate items placed in both the fresh food and freezer compartments. Units with side freezers tend to have higher energy consumption than units with top freezers because the increased door seal area increases heat leakage into the cabinet. Also, since the bottom of the side freezer is located near the compressor and condenser, more heat rejected from these components leaks into the refrigerated space than with top freezer units.

Refrigerator-freezers with bottom freezers also tend to require more energy to operate than top freezers. Increased fan power is required to transport cold air from the bottom freezer up to the top of the fresh food compartment. Bottom freezers also absorb more heat rejected from the compressor and condenser than do top freezers since these components are located adjacent to the freezer compartment. Because of these fundamental differences which affect both utility and energy consumption, DOE has proposed separate classes for automatic defrost refrigerator-freezers with top, side, and bottom freezers.

In addition, certain models of top freezer and side freezer refrigerator-freezers incorporate dispensing services

which provide chilled water, ice, etc., without opening the door. Refrigerator doors which contain dispensing equipment cannot be insulated as well as doors without this feature. Also, electric heaters may be required to prevent condensation from occurring on the dispenser hardware. These factors combine to increase heat which is absorbed by the refrigerated space. Consequently, models with through-the-door services inherently consume more energy than other models. DOE has determined that the convenience associated with such dispenser designs constitutes a distinct utility to those consumers who want this feature, and separate classes have been established for refrigerator-freezer design configurations which provide these services.

Different classes of refrigerators and refrigerator-freezers have not been established for models with different refrigerated volumes. DOE is aware that the energy factor of a particular product tends to increase with increasing volume. This phenomenon is due to the fact that as the volume of a rectangular cabinet increases the ratio of surface area to volume decreases. Since heat transfer into the cabinet is directly related to surface area, two refrigerators of different volumes but with equivalent insulation and refrigeration system efficiency will have different energy factors. DOE has accounted for this relationship by proposing energy efficiency standards which increase linearly with volume. Variable standards are not proposed for units with bottom freezers and units with through the door services due to the availability of only a small range of different volumes. This concept assures that smaller units will not be penalized and all units must achieve proportionally the same increased efficiency improvement. Additional explanation of the determination of this relationship is provided in the "Engineering Analysis Document," TSD No. 5.

4.1.3 Economic Impacts of the Proposed Standards for Refrigerators and Refrigerator-Freezers. Economic benefits and burdens resulting from the proposed standards were assessed from consumer, manufacturer and national perspectives, as described in section 5 of this notice. Four alternative levels of standards were evaluated for each perspective. From this evaluation, the levels proposed in this notice were selected. Impacts resulting from these levels are presented herein. A more detailed presentation on impacts resulting from the levels which were not selected is provided in the "Economic Analysis Document," TSD No. 4.

Consumers

For each class of refrigerator and refrigerator-freezer, the average consumer will realize a lower life cycle cost (a decrease in the discounted total cost of product ownership and use) for higher efficiency regulated products as compared with unregulated products. The reduction in life cycle costs ranges from $91 for automatic defrost refrigerator-freezers with side freezer and through the door services, to $322 for automatic defrost refrigerator-Freezers with top freezer, corresponding to a 4 percent reduction and 21 percent reduction in life cycle costs, respectively.

Consumer payback period, the period of time elapsed before the higher purchase price of more energy efficient products is recouped through reduced energy costs, ranges from 0.54 years for manual defrost refrigerators to 0.79 years for refrigerator-freezers with manual defrost freezers.

Manufacturers

Impacts on refrigerator and refrigerator-freezer manufacturers resulting from standards at the proposed level were estimated. The effects are presented as the percentage of firms expected to be able to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. Therefore, firms having low probabilities of success will not necessarily fail to meet the standards.

At the proposed level of standards, refrigerator and refrigerator-freezer manufacturers estimated to be able to obtain sufficient funds during the 1981 through 1985 period to make the capital investment necessary for January 1986 standards represent approximately 98 percent of current industry production. Included in those firms expected to be able to make the required capital investment are 99 percent of large manufacturers and 98 percent of medium-sized manufacturers. These estimates were developed using analytic techniques which examine the worst case impacts by using conservative assumptions about demand growth, market share and financing. Details of the analysis are provided in the "Economic Analysis Document," TSD No. 4.

Nation

Burdens and benefits from the national perspective encompass the impacts on consumers and manufacturers. In addition, the national perspective addresses those impacts which affect the collective national welfare. The most direct national impacts resulting from the proposed standards are: estimated energy savings; the discounted dollar value of those energy savings; the aggregate discounted consumer costs of more energy efficient products; and the net present value of the above costs and benefits.

Proposed standards on all classes of refrigerators and refrigerator-freezers combined are estimated to save between 3.64 and 7.56 Quadrillion Btu's (QBtu's) cumulative for the 1982 through 2005 period, valued between $6.2 billion and $9.1 billion in 1978 dollars. The aggregate increased cost of more energy efficient refrigerators and refrigerator-freezers during that same 1982 through 2005 period is estimated to be between $1.61 billion and $2.53 billion in 1978 dollars. Therefore, the national net present value of the proposed regulation on refrigerators and refrigerator-freezers is estimated at between $4.5 billion and $6.7 billion. These values are derived from use of the Residential Energy Use Forecasting Model described in section 5.3 of this notice and the "Economic Analysis Document," TSD No. 4.

4.2 Freezers

4.2.1 Summary. "Freezer" means a cabinet designed as a unit for the storage of food at temperatures of 0°F or below, having the ability to freeze food, and having a source of refrigeration requiring an electric energy input only.

The proposed energy efficiency levels for freezers are found in Table 4.2–1. Table 4.2–2 presents the alternate efficiency levels selected for analysis for 1981 and 1986. The levels selected for analysis for 1981 are derived from the 1978 shipment weighted energy factor (SWEF)—which is the summation of number of units of a particular basic model multiplied by the energy factor, divided by the total number of shipments within a class—for each class of freezers. Level 2 in 1981 corresponds to the SWEF in 1978. Level 1 is one standard deviation below the SWEF, while Level 3 and Level 4 are 1 and 2 standard deviations above the SWEF, respectively. The levels selected for analysis for 1986 are derived from a manufacturing cost estimating technique used to estimate materials, investment

and engineering costs required to market products of higher efficiencies in the 1986 time frame. Level 3 in 1986 corresponds to the maximum level which is technologically feasible and economically justified. A detailed explanation on the technological feasibility and economic justifiability can be found in the Engineering Analysis and Economic Analysis Documents, TSD No. 4 and No. 5, respectively. Levels 1 and 2 correspond to proportionally lower levels which have fewer design improvements required and correspond to lower first cost and generally higher life cycle costs.

Table 4.2–1 Energy Efficiency Levels for Freezers (Energy Factor, EF, ft^3/kWh/24 hrs).

Product class	July 15, 1981	January 1, 1986
1. Chest freezer, manual defrost.	6.18 + 0.337V	13.72 + 0.332V
2. Upright freezer, manual defrost.	3.00 + 0.393V	10.85 + 0.342V
3. Upright freezer, automatic defrost.	3.30 + 0.197V	8.07 + 0.093V

V = Total Unadjusted Volume, expressed in ft^3.

Note —See rationale for variable standards in section 4.2.2

Table 4.2–2.—*Alternate Efficiency Levels (Energy Factor, EF, ft^3/kWh/24 hrs)*

Product class	Level	1	2	3	4
1. Chest freezer, manual defrost	1981	4.79 + 0.337V	6.18 + 0.337V	7.42 + 0.337V	8.66 + 0.337V
	1986	7.22 + 0.332V	11.12 + 0.332V	13.72 + 0.332V	.....
2. Upright freezer, manual defrost	1981	1.98 + 0.393V	3.00 + 0.393V	4.01 + 0.393V	5.02 + 0.393V
	1986	6.05 + 0.342V	8.35 + 0.342V	10.85 + 0.342V	.....
3. Upright freezer, automatic defrost	1981	2.47 + 0.197V	3.30 + 0.197V	4.13 + 0.197V	4.95 + 0.197V
	1986	3.97 + 0.093V	6.87 + 0.093V	8.07 + 0.093V	.....

V = Total unadjusted volume, expressed in ft

Level 4 corresponds to an advanced technology case which incorporates design options not on the market place in any great quantity or only in prototype stages at this time.

The rationale for selecting the proposed levels appears in sections 4.2.2 and 4.2.3.

4.2.2 Engineering Analysis.

Methodology

Key energy saving technologies used in the product efficiency analysis for freezers closely parallel those applicable to refrigerators and refrigerator-freezers. For upright models, foam substitution for fiberglass, compressor efficiency improvement, removal of evaporator fan heat from the refrigerated space, gasket improvement, and an increased evaporator and condenser surface area were employed when cost effective. For chest freezers, foam substitution for fiberglass in the lid, relocation of the condenser outside of the cabinet walls, and improvements to compressor motors were methods employed in the analysis.

A computer model, which integrates cabinet design and refrigeration system subroutines, was used to determine the performance of the improved designs. The computer model has been verified against a number of production and prototype freezer designs. A technical discussion of the computer model is contained in the "Engineering Analysis Document," TSD No. 5.

The manufacturing cost analysis assumed a facility consisting of four manufacturing lines for both large and small manufacturers. It was assumed that cabinet door lines were shared by the four production lines and that compressors were purchased from other manufacturers.

Cabinet equipment suitable for polyurethane foam substitution was identified and costs determined. Tooling changes for outer cabinet and liner changes to accommodate the foam substitution were costed. Tooling changes for mounting new purchased parts and other cabinet alterations were evaluated. Some plant costs were identified associated with the additional space required for foaming equipment.

The increased cost per unit of substituting foam material for fiberglass was assessed and the increased labor costs estimated. Part purchased for compressor improvement and anti-sweat heater switch were estimated as appropriate for each efficiency level. These were combined with per unit investment costs to obtain estimates of the total added cost to achieve each efficiency level evaluated. These cost-efficiency relationships are given in the "Engineering Analysis Document," TSD No. 5.

Maximum technologically feasible energy efficiency levels were developed using advanced technologies. To achieve these maximum technologically feasible levels for freezers, the thickness of polyurethane foam insulation was increased throughout the cabinet design, along with increased evaporator and condenser surface areas. High efficiency compressors and fan motors were used, and double gasket systems were incorporated throughout. For the upright automatic defrost freezer, an improved inner distribution system reducing the fan power requirements was employed.

The maximum technologically feasible energy levels for 1986 for freezers are shown in Table 4.2–3 below:

Table 4.2–3 Maximum Technologically Feasible Levels for Freezers (Energy Factor, EF, ft^3/kWh/24 hrs).

Product class	Level
1. Chest freezer, manual defrost	17.5 + .332V
2. Upright freezer, manual defrost	16.1 + .342V
3. Upright freezer, automatic defrost	16.1 + .093V

V = Total Unadjusted Volume, expressed in $ft.^3$

Test Procedures

The test procedures for freezers found at 10 CFR Part 430, Subpart B, provide a standardized method for calculating the efficiency (energy factor, EF) of freezers by measuring the adjusted refrigerated volume and the adjusted electrical energy consumption in a 24-hour period. The measured energy consumption is adjusted for chest and upright freezers to correlate the test results to typical energy household consumption. Energy factors have dimensions of cubic feet per kilowatt hour per 24 hours (ft^3/kWh/24 hrs) and are useful indicators of freezer efficiency since they account for differences in energy consumption between freezers of different volumes.

No comments addressing the freezer test procedures were received in response to the advance notice. however, DOE is proposing an amendment to the test procedures for freezers to reduce testing time and burden on manufacturers. The existing test procedures for freezers require testing at three control settings. The proposed test procedures require testing at only two control settings. These procedures are expected to reduce testing time and burden by about one-third. NBS has determined that energy consumption and energy factors measured via the proposed test procedures will be essentially identical to those determined according to the existing procedures. Consequently, the revision of the test procedures for freezers will not affect previous test results or the levels of energy efficiency standards proposed by this notice.

Individual Product Class Analysis

Three classes of freezers are specified in section 4.2.1 of this notice. These classes are distinguished by performance-related features which affect efficiency and utility. These features are:

(1) configuration,

(2) type of defrost system—manual, automatic.

The configuration of the unit (chest or upright) provides utility which affects efficiency. Upright freezers offer greater accessibility to the freezer contents and more efficient use of floor space than chest type freezers. However, the test procedures assign different usage factors for chest and upright freezers to account for heat leakage into the cabinet when the door is opened. The adjusted energy consumption of upright freezers should tend to be higher than the adjusted energy consumption of chest freezers because of the assigned usage factors. Consequently, DOE has grouped these products into separate classes.

Another performance-related feature which affects utility and efficiency is the defrost system which determines the extent of action by the user needed to accomplish defrosting. Automatic defrost units do not require any user action to accomplish defrosting, and thus provide the consumer with utility not provided by manual defrost units. Automatic defrost units, as compared to manual defrost units, will have lower energy factors because of the additional energy required to melt the frost and to remove the defrost heat to maintain the cabinet temperature. DOE is not aware of any chest freezers which offer the automatic defrost feature; therefore, today's rule proposes a separate class only for automatic defrost upright freezers.

Different classes of freezers have not been established for models with different volumes. DOE is aware that the energy factor of a particular product tends to increase with increasing volume. As with refrigerators, DOE has accounted for this relationship by proposing energy efficiency standards which increase linearly with volume. A detailed discussion of this relationship is found in the "Engineering Analysis Document," TSD No. 5.

4.2.3 Economic Impacts of the Proposed Standards for Freezers. Economic benefits and burdens resulting from the proposed standards were assessed from consumer, manufacturer and national perspectives as described in section 5 of this notice. Four alternative levels of standards were evaluated for each perspective, and from this evaluation, the levels proposed in this notice were selected. Impacts resulting from these levels are presented herein. A more detailed presentation on impacts resulting from the levels which were not selected is provided in the "Economic Analysis Document," TSD No. 4.

Consumers

For each class of freezers, the average consumer will realize a lower life cycle cost (a decrease in the discounted total cost of product ownership and use) for higher efficiency regulated products as compared with unregulated products. The reduction in life cycle costs ranges from $295 for manual defrost chest freezers to $546 for manual defrost upright freezers, corresponding to a 23 percent reduction and 21 percent reduction in life cycle costs, respectively.

Consumer payback period, the period of time elapsed before the higher purchase price of more energy efficient products is recouped through reduced energy costs, ranges from 0.19 years for automatic defrost, upright freezers to 0.44 years for manual defrost, chest freezers.

Manufacturers

Impacts on freezer manufacturers resulting from standards at the proposed level were estimated. These effects are presented as the percentage of firms expected to be able to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. Therefore, firms having low probabilities of success will not necessarily fail to meet the standards.

At the proposed level of standards, freezer manufacturers estimated to be able to obtain sufficient funds during the 1981 through 1985 period to make the capital investment necessary for January 1986 standards represent approximately 75 percent of current industry production. Included in those firms expected to be able to make the required capital investment are 82 percent of large manufacturers. These estimates were developed using analytic techniques which examine the worst case impacts by using conservative assumptions about demand growth, market share and financing. Details of the analysis are provided in the "Economic Analysis Document," TSD No. 4.

Nation

Burdens and benefits from the national perspective encompass the impacts on consumers and manufacturers. In addition, the national perspective addresses those impacts which affect the collective national welfare. The most direct national impacts resulting from the proposed standards are: estimated energy savings; the discounted dollar value of those energy savings; the aggregate discounted consumer costs of more energy efficient products; and the net present value of the above costs and benefits.

Proposed standards on all classes of freezers combined are estimated to save between 0.82 and 1.4 QBtu's during the 1982 through 2005 period, valued between $1.4 billion and $2.0 billion in 1978 dollars. The aggregate increased cost of more energy efficient freezers during that same 1982 through 2005 period is estimated to be between $0.4 billion and $0.6 billion in 1978 dollars. Therefore, the national net present value of the proposed regulation on freezers is estimated at between $1.0 billion and $1.4 billion. These values are derived from use of the Residential Energy Use Forecasting Model described in section 5.3 of this notice and the "Economic Analysis Document," TSD No. 4.

4.3 Clothes Dryers

4.3.1 Summary. "Clothes dryers" mean an electric clothes dryer or gas clothes dryer. "Electric clothes dryer" means a cabinet like product designed to dry fabrics in a tumble-type drum with forced air circulation. The heat source is electricity and the drum and blower(s) are driven by an electric motor(s). "Gas clothes dryer" means a cabinet-like product designed to dry fabrics in a tumble-type drum with forced air circulation. The heat source is gas and the drum and blower(s) are driven by an electric motor(s).

The proposed energy efficiency levels for clothes dryers are found in Table 4.3–1. Table 4.3–2 presents the alternate efficiency levels selected for analysis for 1981 and 1986. The levels selected for analysis for 1981 are derived from the 1978 shipment weighted energy factor (SWEF)—which is the summation of number of units of a particular basic model multiplied by the energy factor, divided by the total number of shipments within a class—from a manufacturing cost estimating technique used to estimate materials, investment, and engineering costs required to market products of higher efficiencies in the 1986 time frame. Level 3 in 1986 corresponds to the maximum level

which is technologically feasible and economically justified. A detailed explanation on the technological feasibility and economic justifiability can be found in the Engineering Analysis and Economic Analysis Documents, TSD No. 4 and No. 5, respectively. Levels 1 and 2 correspond to proportionately lower levels which have fewer design improvements required and correspond to lower first cost and generally higher life cycle costs. Level 4 corresponds to an advanced technology case which incorporates design options not on the market place in any great quantity or only in prototype stages at this time.

Table 4.3–1 Energy Efficiency Levels for Clothes Dryers (Energy Factor, EF, lb/kWh).

Product class	July 15, 1981	January 1, [illegible]
1. Electric, standard size	2.96 – 0.048V	3.31 – 0.048V
2. Electric, compact size, 120 Volt.	2.63	2.85
3. Electric, compact size, 240 Volt.	2.35	2.54
4. Gas	2.71 – 0.048V	2.91 – 0.048V

V = Drum Volume, expressed in ft³.
Note.—See rationale for variable standards in section 4.3.2.

Table 4.3–2—*Alternate Efficiency Levels (Energy Factor, EF, lb/kwh)*

Product class	Level	1	2	3	4
1. Electric, standard size	1981	2.90 – 0.048V	2.96 – 0.048V	3.02 – 0.048V	3.08 – 0.048V
	1986	3.01 – 0.048V	3.11 – 0.048V	3.31 – 0.048V	.....
2. Electric, compact size, 120 Volts	1981	2.54	2.63	2.72	2.81
	1986	.....	2.75	2.85	.....
3. Electric, compact size, 240 Volts	1981	2.34	2.35	2.36	2.37
	1986			2.54	
4. Gas	1981	2.62 – 0.048V	2.71 – 0.048V	2.80 – 0.048V	2.89 – 0.048V
	1986	.....	.....	2.91 – 0.048V	.....

V = Drum volume, expressed in ft³.

The rationale for selecting the proposed levels appears in sections 4.3.2 and 4.3.3.

4.3.2 Engineering Analysis.

Methodology

Four design options were evaluated for improving the efficiency of clothes dryers. These were:

- Reduced drying temperatures;
- Automatic termination with moisture sensing;
- Automatic termination by temperature sensing; and
- Insulation.

The efficiency improvements for these design options were drawn from NBS test data. The use of automatic termination, either through temperature or moisture sensing, is covered in the proposed test procedure amendments discussed in this section, and the associated credits for these options were used in estimating the efficiency improvements. The use of improved insulation, coupled with reduced drying temperatures, was estimated to give a total of 7% improvement in efficiency.

The manufacturing cost analysis assumed one large manufacturer with seven production lines and six small manufacturers with two production lines each. The large manufacturer was assumed to have lines specifically dedicated to electric or gas clothes dryers, while small manufacturers were assumed to share a single line for both types. Compact clothes dryers are assumed to be built on a separate line.

The use of sensors to automatically terminate cycles was costed assuming new tooling to manufacture a bracket for mounting the sensors, purchasing of the sensors, and additional labor to install the sensors. Reduced drying temperatures impact the product's utility by increasing the drying times but should not increase manufacturing cost. Insulation added to the dryer requires major investment in capital equipment and tooling. The analysis assumed four welding fixtures per production line to weld studs onto the interior of the cabinet for holding the insulation; and additional station for finishing the welded pieces; an additional station for additing insulation; and the necessary chains and belts to carry the parts from one station to the other. In addition, an allowance was made for additional area required by added production facilities. This estimate assumed that the additional space could be found within the existing plant.

The costs of additional labor were also added to allow for the welding, painting and insulation installation. The investment costs were amortized as appropriate for the type of investment and combined with the per unit cost estimates for added materials, labor and purchases parts to estimate the final added costs for each efficiency level. These costs were used with the corresponding efficiency levels to develop cost efficiency curves which are shown in the "Engineering Analysis Document," TSD No. 5.

For clothes dryers, the maximum technologically feasible energy efficiency levels utilize the four design options discussed in this section. The maximum technologically feasible energy efficiency levels for 1986 for clothes dryers are shown in Table 4.3–3 below.

Table 4.3–3 Maximum Technologically Feasible Levels for Clothes Dryers (Energy Factor, EF, lb/kWh).

Product class	Level
1. Electric, standard size	3.34 – 0.048V
2. Electric, compact size, 120 Volts	3.01
3. Electric, compact size, 240 Volts	2.72
4. Gas	3.03 – 0.048V

V = Drum Volume, expressed in ft³

Test Procedures

The test procedures for clothes dryers found at 10 CFR Part 430, Subpart B, provide a standardized method to calculate the efficiency (energy factor, EF) of clothes dryers by measuring the energy consumption per cycle. Energy factors have dimensions of pounds of clothes per kilowatt-hour (lb/kWh) [3-pound load for compact dryers and 7-pound load for standard dryers] and are useful indicators of clothes dryer efficiency since they account for the differences in energy consumption between clothes dryers of different capacities and designs.

Several comments specifically addressing the clothes dryer test procedures were received in response to the advance notice. These comments relate to the following areas: (1) energy consumption associated with automatic termination of the drying cycle, (2) test voltage for electric dryers which can operate at any of several voltages, and (3) variability of test results. Based upon NBS analysis of the above comments, DOE determined that the test procedures for clothes dryers should be amended. Proposed amendments to the clothes dryer test procedure address the above comments. The proposed energy efficiency levels for clothes dryers, in today's notice, are based upon the proposed amendment to the clothes dryer test procedures. The proposed amendments provide for measuring different energy consumptions for different types of termination controls by means of different field use factors in the equations for energy consumption per cycle. The energy saving potential for automatic termination is measurable

using the proposed test procedures. For clothes dryers which can operate at any of several voltages, the amendments propose that testing be required at the highest rated voltage. To reduce test variability, the clothes dryer proposed amendment contains recommendations related to test clothes, i.e., preconditioning of new test cloths, test cloth specifications, and moisture content of the test cloth at the start of the test.

Inidividual Product Class Analysis

Four classes of clothes dryers are specified in section 4.3.1 of this notice. These classes are distinguished by the type of energy consumed and the size of the unit. Clothes dryers are segregated based on the type of fuel used (gas or electric). Electric clothes dryers are further divided into standard size (greater than 4.4 ft^3 drum capacity) and compact size (less than 4.4 ft^3 drum capacity) clothes dryers because the test conditions are different for compact and standard dryers, thus resulting in appreciable differences in the energy factor, which is based on pounds of clothes dried per kilowatt hour of electricity used. Compact dryers are further divided into two classes according to operating voltage (120V and 240V) in order to preserve the product's utility (faster drying time of the less efficient 240 volt unit) which constrains the technical design that can be implemented. For the reasons stated above, DOE proposes that the classes for clothes dryers shall be gas; electric compact, 120V; and electric compact, 240V; and electric standard size.

Three comments indicated a need to set energy efficiency standards for clothes dryers which vary with dryer drum capacity, because under the DOE test procedures, clothes dryer efficiency decreases in direct proportion to the increase in dryer drum capacity.

DOE is aware that the efficiency of standard size clothes dryers decreases with increasing volume, due to two facts: one, as capacity increases, there is an increase in the mass of the dryer drum relative to the mass of clothes; and two, due to air flow paths which tend to bypass small clothes loads in larger drums. DOE has accounted for this relationship by proposing energy efficiency standards which decrease linearly with volume. This concept assures that larger units will not be penalized and all units must achieve proportionally the same increased efficiency improvement. Because of the uniformity of the size of the drum of different basic models, it is not necessary to similarly correct for volume dependence for compact dryers. Additional explanation of the determination of these relationships is provided in the "Engineering Analysis Document," TSD No. 5.

4.3.3 Economic Impacts of the Proposed Standards for Clothes Dryers. Economic benefits and burdens resulting from the proposed standards were assessed from consumer, manufacturer and national perspectives as described in section 5 of this notice. Four alternative levels of standards were evaluated for each perspective, and from this evaluation, the levels proposed in this notice were selected. Impacts resulting from these levels are presented herein. A more detailed presentation on impacts resulting from the levels which were not selected is provided in the "Economic Analysis Document," TSD No. 4.

Consumers

For each class of clothes dryers, the average consumer will realize a lower life cycle cost (a decrease in the discounted total cost of product ownership and use) for higher efficiency regulated products as compared with unregulated products. The reduction in life cycle costs ranges from $6 for gas clothes dryers to $47 for electric, standard size clothes dryers, corresponding to a 2 percent and 6 percent reduction in life cycle costs, respectively.

Consumer payback period, the period of time elapsed before the higher purchase price of more energy-efficient products is recouped through reduced energy costs, ranges from 2.8 years for electric, standard size, to 5.5 years for electric, compact size, 120 volt.

Manufacturers

Impacts on clothes on clothes dryer manufacturers resulting from standards at the proposed level were estimated. These effects are presented as the percentage of firms expected to be able to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. Therefore firms having low probabilities of success will not necessarily fail to meet the standards.

At the proposed level of standards, clothes dryer manufacturers estimated to be able to obtain sufficient funds during the 1981 through 1985 period to make the capital investment necessary for January 1986 standards respresent approximately 99 percent of current industry production. Included in those firms expected to be able to make the required capital investment are 99 percent of large manufacturers, 99 percent of medium-sized manufacturers, and 91 percent of small manufacturers. These estimates were developed using analytic techniques which examine the worst case impact by using conservative assumptions about demand growth, market share and financing. Details of the analysis are provided in the "Economic Analysis Document," TSD No. 4.

Nation

Burdens and benefits from the national perspective encompass the impacts on consumers and manufacturers. In addition, the national perspective addresses those impacts which affect the collective national welfare. The most direct national impacts resulting from the proposed standards are: estimated energy savings; the discounted dollar value of those energy savings; the aggregate discounted consumer costs of more energy efficient products; and the net present value of the above costs and benefits.

Proposed standards on all classes of clothes dryers combined are estimated to save between 0.32 QBtu's and 0.59 QBtu's during the 1982 through 2005 period, valued between $0.5 billion and $0.7 billion in 1978 dollars. The aggregate increased cost of more energy efficient clothes dryers during that same 1982 through 2005 period is between $0.2 billion and $0.3 billion in 1978 dollars. Therefore, the national net present value of the proposed regulation on clothes dryers is estimated at between $0.3 billion and $0.4 billion in 1978 dollars. These values are derived from use of the Residential Energy Use Forecasting Model described in section 5.3 of this notice and the "Economic Analysis Document," TSD No. 4.

4.4 Water Heaters

4.4.1 Summary. "Water heater" means an automatically controlled thermally insulated vessel designed for heating water and storing heated water, which utilizes either oil, gas, or electricity as the fuel or energy source for heating the water, which is designed

to produce hot water at a temperature of less than 180°F.

The proposed energy efficiency levels for water heaters are found in Table 4.4–1. Table 4.4–2 presents the alternate efficiency levels selected for analysis for 1981 and 1986.

Table 4.4–1 Energy Efficiency Levels for Water Heaters (Energy Factor, EF).

Product class	July 15, 1981	January 1, 1986
1. Electric	0.860 – 0.0013V	0.996 – 0.0013V
2. Gas	0.546 – 0.0018V	0.653 – 0.000625V
3. Oil	No Standard.	No Standard.

V = Storage Volume, expressed in gallons.
Note—See rationale for variable standards in section 4.4.2.

Table 4.4–2.—*Alternate Efficiency Levels (Energy Factor, EF)*

Product class	Level	1	II	3	4
1. Electric	1981	0.828 – 0.0013V	0.860 – 0.0013V	0.892 – 0.0013V	0.923 – 0.0013V
	1986	0.946 – 0.0013V	0.986 – 0.0013V	0.996 – 0.0013V	
2. Gas	1981	0.508 – 0.0018V	0.546 – 0.0018V	0.584 – 0.0018V	0.621 – 0.0018V
	1986	0.633 – 0.000625V	0.643 – 0.000625V	0.653 – 0.000625V	
3. Oil		NA			
		NA			

V = Storage Volume, expressed in gallons.
NA = Not available.

The levels selected for analysis for 1981 are derived from the 1978 shipment weighted energy factor (SWEF)—which is the summation of number of units of a particular basic model multiplied by the energy factor, divided by the total number of shipments within a class—for each class of water heaters. Level 2 in 1981 corresponds to the SWEF in 1978. Level 1 is one standard deviation below the SWEF, while Level 3 and Level 4 are 1 and 2 standard deviations above the SWEF, respectively. The levels selected for analysis for 1986 are derived from a manufacturing cost estimating technique used to estimate materials, investment and engineering costs required to market products of higher efficiencies in the 1986 time frame. Level 3 in 1986 corresponds to the maximum level which is technologically feasible and economically justified. A detailed explanation of the technological feasibility and economic justifiability can be found in the Engineering Analysis and Economic Analysis Documents, TSD No. 4 and No. 5, respectively. Levels 1 and 2 correspond to proportionally lower levels which have fewer design improvements required and correspond to lower first cost and generally higher life cycle costs. Level 4 corresponds to an advanced technology case which incorporates design options not on the market place in any great quantity or only in prototype stages at this time.

The rationale for selecting the proposed levels appears in sections 4.4.2 and 4.4.3.

No standards are proposed today for the class of oil water heaters. This is based largely on the small number of oil water heaters being produced today by generally small manufacturers and because many older oil water heaters are being replaced by other classes of water heaters; consequently, it was determined not to be economically justified to set standards for oil water heaters.

4.4.2 Engineering Analysis.

Methodology

In performing the efficiency improvement analysis, the available technology options for improving the efficiencies of water heaters are:

- Improved insulation;
- Increased flue baffling with reduced burner input;
- Vent dampers and intermittent ignition devices (IIDs); and
- Heat traps.

In the analysis of electric water heaters various efficiency levels were projected by using improved insulation either in the form of higher density and thicker fiberglass insulation or the use of foamed polyurethan insulation. The analysis was carried out using a 52 gallon upright unit as a baseline. The highest energy factor achieved with available technology incorporated foam insulation and heat traps.

For the analysis of gas-fired water heaters, it was assumed that increased flue baffling for improved heat transfer plus reduced burner input would be implemented at all efficiency levels. This was accompanied by varying levels of improved insulation as described above for electric water heaters. The highest efffiency level evaluated employed a vent damper, IID, and advanced fiberglass insulation.

Estimates of the energy factors which could be achieved using various combinations of these design options were made using data from computer simulations plus laboratory measurements. These were complemented by engineering analysis based on published energy factors for various models of water heaters obtained from the California list of approved water heaters, advertisements for water heaters disclosing insulation thickness and energy factors, information from manufacturers on insulation used, and various water heater configurations on which operational data was available. The efficiency improvements from the use of heat traps were based on the DOE test procedure values. Vent damper and IID credits were estimated by engineering analysis based on laboratory test data.

The manufacturing cost analysis assumed that large manufacturers had three major production lines plus one specialty line, and small manufacturers had a major production line plus one specialty line. It was assumed that both gas and electric units could be manufactured on the same line.

Major changes in implementing design options dealt primarily with the change in amount of insulation used. To increase fiberglass insulation thickness, costs included changes to existing tooling to manufacture new size insulation jackets, increased material costs for added jacket area and additional insulation, and increased assembly line time due to handling thicker and denser insulations. It was assumed that existing presses would be able to handle the larger jacket pieces. A major capital equipmemt investment is required for foamed insulation. For costing purposes it was assumed that a manufacturer would elect to foam all manufactured water heaters of one class after making the initial decision to go to foam. The cost of this equipment was amortized over the production volumes of the product class being analyzed.

To improve the efficiency of gas-fired water heaters by reducing burner input and increasing flue baffling, it was assumed that tooling for manufacturing only the modified flue baffle was required.

In order to implement a design option employing an intermittent ignition device and a vent damper it was assumed that a manufacturer would purchase both parts and would make an investment in tooling for making a bracket to mount the IID. In addition, added labor costs for the installation of the two items were included in the costs. The design option employing a heat trap assumed that the heat trap would be purchased and additional labor would be required for installing it. These manufacturing costs were used with the efficiency levels estimated as described above to generate cost efficiency relationships for water heaters. These cost efficiency relationships and their derivation are described in detail in the "Engineering Analysis Document," TSD No. 5.

The maximum technologically feasible energy efficiency levels for 1986 for water heaters are shown in Table 4.4—3

below. To achieve the maximum technologically feasible efficiency level for a gas-fired water heater, manufacturers must convert their product lines to use foam insulation and to go to a condensing design.

Table 4.4–3 Maximum Technologically Feasible Energy Efficiency Level for Water Heaters (Energy Factor, EF).

Product class	Level
1. Electric	0.979 – 5.56 $\times 10^{-4}$ V
2. Gas	0.885 – 6.5 $\times 10^{-4}$ V
3. Oil	N/A

V = Storage Volume, expressed in gallons.

Condensing may be achieved either by use of a low thermal mass side-arm heater, which will also reduce standby losses, or by use of a power vent or power burner with condensing and existing center flue designs. For electric water heaters, the maximum technologically feasible level covered by the existing test procedures would be achieved by foam insulation plus heat traps. Recently a heat pump water heater has been introduced in the market. However, the existing DOE test procedures do not evaluate the performance of this product. Because the performance of a heat pump water heater is different than that of a standard electric water heater, a new class would be established when amendments to the test procedure are promulgated. For these reasons, maximum technologically feasible for electric water heaters does not reflect the incorporation of the heat pump water heater. In addition, for both the gas and the alternative electric water heater configurations, the suitability of the maximum technologically feasible unit for use in the retrofit market is questionable and a requirement that all units be manufactured to this level would have severe consumer utility impacts in that replacements would not be able to be easily adaptable to existing size constraints within the building.

Test Procedures

The test procedures for water heaters found at 10 CFR Part 430, Subpart B, are used to measure key operating characteristics which include:

(1) Recovery efficiency, the ratio of the heat transferred to the water to (a) the energy input to the heating elements (for electric water heaters); or (b) the heat content of the fuel consumed by the burners (for gas or oil water heaters);

(2) Standby loss, the ratio of the heat loss per hour to the heat content of the stored water above room temperature;

(3) Average daily energy consumption;

(4) First hour rating, the maximum volume of hot water which can be delivered at a 90° F temperature rise in a 1-hour period; and

(5) Daily hot water energy consumption.

By using the test procedures, the energy factor as a management of efficiency for a water heater can be derived. The energy factor for a water heat is the quotient of the energy content in the average daily hot water usage divided by the average daily energy input to the water heaters. Therefore, DOE proposes to use the energy factor as the basis for energy efficiency standards for water heaters.

One electric utility stated that for off-peak rate structures to be successful, homeowners need 80- to 150-gallon water heaters, which may be eliminated by the existing test procedures unless they are changed or the energy standard for water heaters varies with capacity. Three comments expressed concern that the DOE test procedures for water heaters penalize the larger storage-type water heaters. The comments suggested that there is a possibility that storage-type water heaters will be driven from the market place, thereby depriving consumers of the opportunity to take advantage of time-of-day electric rates. One comment urged DOE to develop a measure of efficiency which includes first hour supply rating. DOE is proposing energy efficiency levels that vary with capacity in order not to discriminate against larger storage water heaters. The first hour supply rating test procedures for water heaters have been amended in the final test procedures for water heaters prescribed on September 7, 1979 (44 FR 52632).

A manufacturer and an electric utility company claim that first-hour supply rating for water heaters is meaningless to the concept of energy conservation and should not be part of the standard. Today's proposed standard for water heaters does not use first-hour supply rating to measure efficiency.

Individual Product Class Analysis

Three classes of water heaters are specified in section 4.4.1 of this notice. These classes are distinguished by the type of energy consumed, i.e., gas, electric or oil. Efficiencies of water heaters vary widely depending on fuel type and storage volume. Without distinct classes by fuel type, certain products using a specific fuel type could be eliminated from the market place.

Different classes of water heaters have not been established for models with different storage volumes. DOE is aware that the energy factor of a particular product tends to decrease with increasing storage volume. DOE has accounted for this relationship by proposing energy efficiency standards which decrease linearly with an increase of storage volume. Additional explanations of the determination of these curves and classes are provided in the "Engineering Analysis Document," TSD No. 5.

Three comments expressed concern that the classes of water heaters identified in the advance notice would eliminate off-peak-type water heaters. Other comments urged the consideration of water heater capacity and design in establishing product classes. With the establishment of efficiency standards by volume, DOE has addressed these comments in today's proposed rule.

4.4.3 Economic Impacts of the Proposed Standards for Water Heaters. Economic benefits and burdens resulting from the proposed standards were assessed from consumer, manufacturer and national perspectives as described in section 5 of this notice. Four alternative levels of standards were evaluated for each perspective, and from this evaluation, the levels proposed in this notice were selected. Impacts resulting from these levels are presented herein. A more detailed presentation on impacts resulting from the levels which were not selected is provided in the "Economic Analysis Document," TSD No. 4.

Consumers

For each class of water heaters, the average consumer will realize a lower life cycle cost (a decrease in the discounted total cost of product ownership and use) for higher efficiency regulated products as compared with unregulated products. The reduction in life cycle costs ranges from $130 for gas water heaters to $170 for electric water heaters, corresponding to a 15 percent and 8 percent reduction in life cycle costs, respectively.

Consumer payback period, the period of time elapsed before the higher purchase price of more energy-efficient products is recouped through reduced energy costs, ranges from 0.73 years for electric water heaters to 1.1 years for gas water heaters.

Manufacturers

Impacts on water heater manufacturers resulting from standards at the proposed level were estimated. These effects are presented as the percentage of firms expected to be able

to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. Therefore, firms having low probabilities of success will not necessarily fail to meet the standards.

At the proposed level of standards, water heater manufacturers estimated to be able to obtain sufficient funds during the 1981 through 1985 period to make the capital investment necessary for January 1986 standards represent approximately 80 percent of current industry production. Included in those firms expected to be able to make the required capital investment are 85 percent of large manufacturers. These estimates were developed using analytic techniques which examine the worst case impacts by using conservative assumptions about demand growth, market share and financing. Details of the analysis are provided in the "Economic Analysis Document," TSD No. 4.

Nation

Burdens and benefits from the national perspective encompass the impacts on consumers and manufacturers. In addition, the national perspective addresses those impacts which affect the collective national welfare. The most direct national impacts resulting from the proposed standards are: estimated energy savings; the discounted dollar value of those energy savings; the aggregate discounted consumer costs of more energy efficient products; and the net present value of the above costs and benefits.

Proposed standards on all classes of water heaters combined are estimated to save between 3.87 QBtu's and 5.91 QBtu's during the 1982 through 2005 period, valued between $5.9 billion and $6.6 billion in 1978 dollars. The aggregate increased cost of more energy efficient water heaters during that same 1982 through 2005 period is between $0.5 billion and $0.6 billion in 1978 dollars. Therefore, the natonal net present value of the proposed regulation on water heaters is estimated at between $5.4 billion and $6.0 billion in 1978 dollars. These values are derived from use of the Residential Energy Use Forecasting Model described in section 5.3 of this notice and the "Economic Analysis Document," TSD No. 4.

4.5 Room Air Conditioners

4.5.1 Summary. "Room air conditioner" means a consumer product which is powered by a single phase electric current, which is an encased assembly designed as a unit for mounting in a window or through the wall for the purpose of providing delivery of conditioned air to an enclosed space, which is not a "packaged terminal air conditioner." It includes a prime source of refrigeration and may include a means for ventilating and heating.

"Packaged terminal air conditioner" means a wall sleeve and a separate unencased builder specified combination of heating and cooling assemblies intended for mounting through the wall. It includes a prime source of refrigeration, separable outdoor louvers, forced ventilation, and heating availability by builders choice of hot water, steam or electricity.

The proposed energy efficiency levels for room air conditioners are found in Table 4.5–1. Table 4.5–2 presents the alternate efficiency levels selected for analysis for 1981 and 1986. The levels selected for analysis for 1981 are derived from the 1978 shipment weighted energy factor (SWEF)—which is the summation of number of units of a particular basic model multiplied by the energy factor, divided by the total number of shipments within a class—for each class of room air conditioners. Level 2 in 1981 corresponds to the SWEF in 1978. Level 1 is one standard deviation below the SWEF, while Level 3 and Level 4 are 1 and 2 standard deviations above the SWEF, respectively. The levels selected for analysis for 1986 are derived from a manufacturing cost estimating technique used to estimate materials, investment and engineering costs required to market products of higher efficiencies in the 1986 time frame. Level 3 in 1986 corresponds to the maximum level which is technologically feasible and economically justified.

Table 4.5–1 Energy Efficiency Levels for Room Air Conditioners (Energy Efficiency Ratio, EER, Btu/Watt-hr).

Product class	July 15, 1981	January 1, 1986
1. With outdoor side louvers; capacity of 6000 Btu/hr or less.	6.5	8.4
2. With outdoor side louvers; capacity greater than 6000 Btu/hr but less than 20,000 Btu/hr.	7.5	9.5
3. With outdoor side louvers; capacity of 20,000 Btu/hr or greater.	6.7	8.4
4. Without outdoor side louvers or reverse cycle.	6.7	9.0

Table 4.5–2.—*Alternative Efficiency Levels (Energy Efficiency Ratio, EER, Btu/Watt-hr)*

Product class	Level	1	2	3	4
1. With outdoor side louvers; capacity of 6,000 Btu/hr or less.	1981	5.4	6.3	7.1	7.9
	1986	7.5	8.4	9.1	
2. With outdoor side louvers; capacity greater than 6,000 Btu/hr but less than 20,000 Btu/hr.	1981	6.0	7.2	8.3	9.5
	1986	8.0	9.1	9.5	
3. With outdoor side louvers; capacity of 20,000 Btu/hr or greater.	1981	6.1	6.8	7.2	7.7
	1986	7.5	8.0	8.4	
4. Without outdoor side louvers; or reverse cycle...	1981	5.4	6.5	7.6	8.8
	1986	8.0	9.1	9.5	

A detailed explanation on the technological feasibility and economic justifiability can be found in the Engineering Analysis and Economic Analysis Documents, TSD No. 4 and No. 5, respectively. Levels 1 and 2 correspond to proportionally lower levels which have fewer design improvements required and correspond to lower first cost and generally higher life cycle costs. Level 4 corresponds to an advance technology case which incorporates design options not on the market place in any great quantity or only in prototype stages at this time.

The rationale for selecting the proposed levels appears in sections 4.5.2 and 4.5.3.

4.5.2 Engineering Analysis.

Methodology

The room air conditioner engineering efficiency analysis utilized a component computer model which explicitly treats all major system elements. A detailed discussion of the computer model is contained in the "Engineering Analysis Document," TSD No. 5. Energy savings were identified through the use of: increased heat exchanger surface area, improved fan motor efficiency, and improved compressor efficiency. Condenser surface area was increased to the limit of standard window dimensions. Evaporator surface area was increased to a maximum to provide

approximately 54°F evaporating temperature under standard test conditions. Evaporating temperatures above that level are judged to result in unacceptable dehumidification. Cabinet sizes to accommodate the increased heat exchanger frontal area were assumed to be limited to the present five different cabinets plus an additional larger cabinet to permit increased efficiency in the largest class of room air conditions. Because of increases in heat exchanger surface area, the compressor capacity was reduced to maintain the rated unit capacity. When standard compressor increments would meet the design criteria, they were incorporated; otherwise, the stroke of the existing compressor was reduced to achieve the required rating. Whenever shaded pole fan motors were used on the baseline units, higher efficiency permanent split capacitor motors were substituted. Fan diameter and blade pitch were adjusted to achieve near optimal air volume for the increased heat exchanger surface areas as described above.

The manufacturing facility was assumed to consist of five assembly lines capable of manufacturing five chassis with a variety of cabinet heights. Increased investment, due to the addition of a larger cabinet, was included along with tooling changes for any fan or compressor change requiring new mounting brackets. Increased costs for fan motors and fan blades to maintain near optimum air volume as well as reduced costs for the compressor were estimated.

As the that transfer surface areas are increased to dimensional and performance constrained limits, the remaining gains in efficiency are left to the compressor and fan systems. To determine maximum technologically feasible efficiency levels, a compressor with an energy efficiency ratio of 11 was used (the highest compressor efficiency available in January 1980 was just under 10). Permanent split capacitor fans with improved air induction and exhaust systems to reduce fan systems losses were also employed. The maximum technologically feasible energy efficiency levels for 1986 are shown in Table 4.5–3.

Test Procedures

The test procedures for room air conditioners found at 10 CFR Part 430, Subpart B, provide a standard method for testing to determine the energy efficiency ratio (EER) of room air conditioners by measuring the cooling capacity and electrical energy consumed by a room air conditioner at standard operating conditions. DOE has received comments regarding the inability of the present test procedures to measure the effect on performance of design options which affect the unit as the compressor cycles on and off (automatic fan). The National Bureau of Standards is evaluating the automatic fan mode of operation of room air conditioners to determine its contribution to cyclic performance. Amendments to the test procedure will be proposed if it is determined that the automatic fan mode of operation contributes to increasing the efficiency of room air conditions. Also, DOE has proposed amending the general provisions of the Department's energy conservation program for consumer products (45 FR 2632), January 11, 1980, to clarify room air conditioner test procedures as applied to package terminal air conditioners (PTAC's). Any air conditioning product which a manufacturer identifies as a PTAC but which does not fall within DOE's definition is nevertheless covered by energy efficiency standards and is included in without outdoor side louvers room air conditions or reverse cycle room air conditioners.

Table 4.5–3. Maximum Technologically Feasible Levels for Room Air Conditioners (Energy Efficiency Ratio, EER, Btu/Watt-hr).

Product class	Level
1. With outdoor side louvers; capacity of 6000 Btu/hr or less	10.8
2. With outdoor side louvers; capacity greater than 6000 Btu/hr but no more than 20,000 Btu/hr	12.1
3. With outdoor side louvers; capacity greater than 20,000 Btu/hr	9.8
4. Without outdoor side louvers or reverse cycle	11.0

One comment suggested that ASHRAE Standard 37–69, "Methods of Testing for Rating Unitary Air Conditioning and Heat Pump Equipment," be included in the DOE test procedure for room air conditioners as an alternate test procedure for PTAC's. By rule, DOE is proposing to exclude PTAC's from the consumer products' efficiency program and therefore no alternate test procedure is necessary.

Individual Product Class Analysis

Seven comments suggested that the classes of room air conditioners identified in the advance notice be further classified on the basis of capacity because improvements in efficiency are limited by cabinet dimensions and component configurations. Also, some comments requested that portable room air conditioners be considered a separate class and the voltage is a feature which has utility and an impact on performance.

Four classes of room air conditioners are specified in section 4.5.1 of this notice. These classes are distinguished either by configuration, design or capacity of the unit. Room air conditioners are segregated according to: (1) configuration, whether or not they have outdoor side louvers; (2) design, whether or not they are reverse cycle; and (3) capacity.

DOE considered further segregating room air conditioners on the basis of voltage; however, as discussed in the "Engineering Analysis Document," TSD No. 5, DOE has determined that, while voltage is a feature that provides utility, it does not affect efficiency. DOE also considered segregation of room air conditioners based upon portability. However, research done by NBS indicates that the weight of approximately 34 pounds is the limit for portability and the maximum size is a cube with dimensions of 15 inches on each side. Based upon these criteria, DOE is not aware of any portable air conditioners on the market. Thus, DOE has not established a class for portable room air conditioners.

Room air conditioners with outdoor side louvers were segregated because the outdoor side louvers increase air flow over the condenser coils and reduce recirculation of cooled air; therefore, higher efficiency levels are possible on units as compared to those without outdoor side louvers. The units were further segregated according to capacity, which affects efficiency. Improvements in efficiency for units larger than 20,000 Btu/hr are limited due to restraints on cabinet size (maximum window opening) which impacts product design. Improvements in efficiency for units 6,000 Btu/hr or less are limited because of the relatively greater costs associated with incremental improvements in efficiency for products of this size. This is discussed in detail in the "Engineering Analysis Document," TSD No. 5. Units which are greater than 6,000 Btu/hr and less than 20,000 Btu/hr have the potential for the greatest improvements in efficiency at the least cost.

Without outdoor side louvers room air conditioners and reverse cycle room air conditioners are separate categories because of features which affect efficiency. Room air conditioners without outdoor side louvers offer the consumer the option of mounting the unit flush with the outside wall. However, this configuration decreases product efficiency because the flow of air over the condenser coil is reduced and cooled air is recirculated, further decreasing the efficiency of the unit. Reverse cycle room air conditioners offer the utility of being able to provide air heating by reversing refrigerant flow.

The efficiency of a reverse cycle room air conditioner is decreased because of losses in efficiency associated with the reversing valve. While these units have different utility, they have been included in the same class because improvements in efficiency for the two are approximately equal.

4.5.3 Economic Impacts of the Proposed Standards for Room Air Conditioners. Economic benefits and burdens resulting from the proposed standards were assessed from consumer, manufacturer and national perspectives as described in section 5 of this notice. Four alternative levels of standards were evaluated for each perspective. From this evaluation, the levels proposed in this notice were selected. Impacts resulting from these levels are presented herein. A more detailed presentation on impacts resulting from the levels which were not selected is provided in the "Economic Analysis Document," TSD No. 4.

Consumers

For each class of room air conditioners, the average consumer will realize a lower life cycle cost (a decrease in the discounted total cost of product ownership and use) for higher efficiency regulated products as compared with unregulated products. The reduction in life cycle costs ranges from $33 for room air conditioners with outdoor side louvers; capacity greater than 6000 Btu/hr but no more than 20,000 Btu/hr, to $112 for room air conditioners with outdoor side louvers; capacity greater than 20,000 Btu/hr, corresponding to a 5 percent reduction and 6.8 percent reduction in life cycle costs, respectively.

Consumer payback period, the period of time elapsed before the higher purchase price of more energy efficient products is recouped through reduced energy costs, ranges from 1.5 years for those with outdoor side louvers, capacity less than 6000 Btu/hr to 4.6 years for those with outdoor side louvers, capacity greater than 6000 Btu/hr but less than 20,000 Btu/hr.

Manufacturers

Impacts on room air conditioner manufacturers resulting from standards at the proposed level were estimated. These effects are presented as the percentage of firms expected to be able to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. Therefore, firms having low probabilities of success will not necessarily fail to meet the standards.

At the proposed level of standards, room air conditioner manufacturers estimated to be able to obtain sufficient funds during the 1981 through 1985 period to make the capital investment necessary for January 1986 standards represent approximately 93 percent of current industry production. Included in those firms expected to be able to make the required capital investment are 96 percent of large manufacturers and 72 percent of medium-sized manufacturers. These estimates were developed using analytic techniques which examine the worst case impacts by using conservative assumptions about demand growth, market share and financing. Details of the analysis are provided in the "Economic Analysis Document," TSD No. 4.

Nation

Burdens and benefits from the national perspective encompass the impacts on consumers and manufacturers. In addition, the national perspective addresses those impacts which affect the collective national welfare. The most direct national impacts resulting from the proposed standards are: estimated energy savings; the discounted dollar value of those energy savings; the aggregate discounted consumer costs of more energy efficient products; and the net present value of the above costs and benefits.

Proposed standards on all classes of room air conditioners combined are estimated to save between 0.22 QBtu's and 0.56 QBtu's during the 1982 through 2005 period, valued between $0.4 billion and $0.7 billion in 1978 dollars. The aggregate increased cost of more energy efficient room air conditioners during that same 1982 through 2005 period is between $0.2 billion and $0.3 billion in 1978 dollars. The national net present value of the proposed regulation on room air conditioners is estimated at between $0.2 billion and $0.4 billion in 1978 dollars. These values are derived from use of the Residential Energy Use Forecasting Model described in section 5.3 of this notice and the "Economic Analysis Document," TSD No. 4.

4.6 Home Heating Equipment Not Including Furnaces

4.6.1 Summary. "Home heating equipment, not including furnaces" means vented home heating equipment and unvented home heating equipment.

"Unvented home heating equipment" means a class of home heating equipment not including furnaces used for the purpose of furnishing heat to a space proximate to such heater directly from the heater and without duct connections and includes electric heaters and unvented gas heaters.

"Vented home heating equipment" means a class of home heating equipment not including furnaces designed to furnish warmed air to the living space of a residence, directly from the device without duct connections and includes: vented wall furnace, vented floor furnace, or vented room heater.

DOE anticipates that a test procedure amendment for home heating equipment not including furnaces to incorporate several technical changes and to include a thermal stack damper analysis will be issued later in 1980. Because the installation of a thermal stack damper for home heating equipment is considered an available major design option for the improvement in energy efficiency of home heating equipment, DOE has determined that the test procedures for home heating equipment should be amended to include the measurement of the effect of energy efficiency of thermal stack dampers before the development of the efficiency standard can be adequately calculated. Today's notice therefore assigns "space reserved" to this product type.

4.7 Kitchen Ranges and Ovens

4.7.1 Summary. "Kitchen ranges and ovens" mean consumer products that are used as the major household cooking appliances. They are designed to cook or heat different types of food by one or more of the following sources of heat: gas, electricity, or microwave energy. Each product may consist of a horizontal cooking top containing one or more surface units and/or one or more heating compartments.

The proposed energy efficiency levels for kitchen ranges and ovens are found in Table 4.7–1. Table 4.7–2 presents the alternate efficiency levels selected for analysis for 1981 and 1986. The levels selected for analysis for 1981 are derived from the 1978 shipment weighted energy factor (SWEF)—which is the summation of number of units of a particular basic model multiplied by the energy factor, divided by the total number of shipments within a class—for each class of kitchen ranges and ovens. Level 2 in 1981 corresponds to the SWEF in 1978. Level 1 is one standard deviation below the SWEF, while Level 3 and Level 4 are 1 and 2 standard deviations above the SWEF, respectively. The levels selected for analysis for 1986 are derived from a

manufacturing cost estimating technique used to estimate materials, investment and engineering costs required to market products of higher efficiencies in the 1986 time frame. Level 3 in 1986 corresponds to the maximum level which is technologically feasible and economically justified. A detailed explanation on the technological feasibility and economic justification can be found in the Engineering Analysis and Economic Analysis Documents, TSD No. 4 and No. 5, respectively. Levels 1 and 2 correspond to proportionally lower levels which have fewer design improvements required and correspond to lower first cost and generally higher life cycle costs. Level 4 corresponds to an advanced technology case which incorporates design options not on the market place in any great quantity or only in prototype stages at this time.

Table 4.7–1 Energy Efficiency Levels For Kitchen Ranges and Ovens (Energy Factor, EF, %).

Product class	July 15, 1981	January 1, 1986
1. Microwave oven	No standard.	No standard.
2. Electric cooking top	No standard.	No standard.
3. Electric oven	17.6–1.57V	20.2–1.57V
4. Electric oven, self-cleaning	17.6–1.57V	18.3–1.57V
5. Gas cooking top	31	45
6. Gas oven	6.4–0.73V	9.2–0.73V
7. Gas oven, self-cleaning	7.2–0.73V	8.6–0.73V

V = Total oven volume, expressed in ft ³.

Note.—See rationale for variable standards in section 4.7.2.

Table 4.7–2.—*Alternative Efficiency Levels (Energy Factor, EF Percent)*

Product class	Level	1	2	3	4
1. Microwave oven	1981	30	36	43	50
	1986			44	
2. Electric cooking top	1981	72	75	79	83
	1986			79	
3. Electric oven	1981	16.4–1.57V	17.6–1.57V	18.8–1.57V	20.0–1.57V
	1986	18.1–1.57V	19.7–1.57V	20.2–1.57V	
4. Electric oven, self cleaning	1981	16.3–1.57V	17.6–1.57V	18.8–1.57V	20.8–1.57V
	1986	16.3–1.57V	18.1–1.57V	18.3–1.57V	
5. Gas cooking top	1981	24	31	37	44
	1986		42	45	
6. Gas oven	1981	5.0–0.73V	6.4–0.73V	7.8–0.73V	9.2–0.73V
	1986	6.6–0.73V	6.8–0.73V	9.2–0.73V	
7. Gas oven, self cleaning	1981	6.5–0.73V	7.2–0.73V	7.9–0.73V	8.6–0.73V
	1986	8.0–0.73V	8.3–0.73V	8.6–0.73V	

V = Total oven volume, expressed in ft ³.

The rationale for selecting the proposed levels appears in sections 4.7.2 and 4.7.3.

No standards are proposed today for the classes of microwave ovens and electric cooking tops. DOE has determined that there are no cost effective design options for reducing the energy consumption of these classes without affecting product utility which would result in a significant conservation of energy.

4.7.2 Engineering Analysis.

Methodology

In performing the efficiency analysis, 6 different design options were applied as appropriate to improve the efficiency of kitchen ranges and ovens. These design options were:

- increased insulation by using thicker or denser fiberglass;
- improved gaskets or reduced excess air;
- intermittent ignition device to replace standing pilot;
- reduced oven mass through smaller cavities or lighter racks;
- reduced electric resistance heater contact resistance; and
- reflective pans under burners.

The analysis of the efficiency improvement which comes from the application of these design options was based on engineering analysis of experimental data and industry data from Form CS–179.

The manufacturing cost analysis assumed one large manufacturer with four major production lines and eleven small manufacturers each with one specialty production line for electric ovens and cook tops. For gas ovens and cook tops, assumptions made in the analysis were that there were three large manufacturers with three major production lines and one speciality production line, plus five small manufacturers with two specialty production lines. These production lines were distributed among standard products and speciality units such as high oven combination ranges and other consumer products.

For electric ranges and ovens, the costs associated with implementing the design options resulted from additional material for denser fiberglass and thicker insulation, and tooling for a smaller oven cavity. The costs associated with these changes, calculated on a per unit basis including an allowance for additional labor, were totaled to obtain an estimated incremental cost change for each efficiency level. The increment in sheathed electric resistance heater element efficiency for electric cooking tops was costed by assuming a higher reject rate (of lower efficiency units) and more time in quality control, resulting in an additional labor allowance per unit. For gas ranges and ovens, the costs to use an intermittent ignition device to replace the standing pilot assumed that either a spark igniter or globar for the range top and oven were purchased. Additionally, costs for retooling to manufacture a mounting bracket, tooling changes to the range top to accommodate the intermittent ignition device, and additional labor for assembly were all estimated. Costs attributed to improved insulation were the same as those for electric units. The cost efficiency relationships developed are given in the "Engineering Analysis Document," TSD No. 5.

The maximum technologically feasible energy efficiency levels for these products were based on the efficiency of units presently on the market. These units include design options such as improved insulation, better isolation of the oven liner from the outside cabinet, forced convection, and reduced vent air. The maximum technologically feasible efficiency levels for 1986 for kitchen ranges and ovens are detailed in Table 4.7–3.

Table 4.7–3 Maximum Technologically Feasible levels for Kitchen Ranges and Ovens (Energy Factor, EF, %).

Product class	Level
1. Microwave oven	44
2. Electric cooking top	79
3. Electric oven	20.2–1.57V
4. Electric oven, self-cleaning	18.4–1.57V
5. Gas cooking top	45
6. Gas oven	9.3–0.73V
7. Gas oven, self-cleaning	8.7–0.73V

V = Total oven volume, expressed in ft ³.

Test Procedures

The test procedures for kitchen ranges and ovens found at 10 CFR Part 430, Subpart B, provide a standardized method for determining the efficiency (energy factor, in percent) for kitchen ranges and ovens by measuring annual useful cooking energy output and the total energy input at standard conditions for conventional cooking tops, conventional and microwave ovens.

DOE anticipates that it will amend the test procedures within the next 12 months to add the following products which presently represent only a small fraction of the market: (1) cooking tops which utilize induction surface heating elements; (2) single compartment ovens which are capable of heating food by means of electric resistance heaters and microwave energy; (3) a microwave oven in combination with a conventional oven; and (4) a microwave oven in combination with a conventional cooking top. Revision of the test procedures is not expected to affect previous testing results or to affect the minimum energy efficiency levels proposed by this notice. The energy factor is a useful indicator of the efficiency of conventional cooking tops, conventional ovens and microwave ovens because it accounts for differences in energy consumption corresponding to typical consumer usage. For multiple conventional ovens, it is intended that the energy factor for each conventional oven be determined using the test procedures cited in section 4.1.4.1 of Appendix I of Subpart B. Cooking efficiency, the ratio of the cooking energy output during a laboratory test to the cooking energy input for the same test, another measure of energy consumption in the test procedures, has not been chosen as the measure of energy consumption because by failing to include the annual energy consumption of pilot lights, clocks and self-cleaning, it does not represent typical consumer energy consumption as well as the energy factor.

Several comments received in response to the advance notice suggested that the standards should take into account the following issues: (1) the energy used by browning elements in microwave ovens, (2) the energy factor varies with capacity for conventional gas and electric ovens, and (3) thermostatically controlled burners reduce the energy consumed by conventional gas cooking tops. DOE believes that the choice of proposed classes and varying efficiency levels by volume proposed today adequately address the above comments.

Individual Product Class Analysis

Seven classes of kitchen ranges and ovens are specified in section 4.7.1 in this notice. These classes are distinguished by performance related features which affect both the unit's efficiency and utility. These features are: (1) the type of energy consumed (gas or electric), (2) the function of the unit (cooking top, conventional oven or microwave oven), and (3) the type of cleaning system. Failure to establish separate classes according to the type of energy consumer might result in the elimination of all basic models consuming a certain type of energy.

Kitchen ranges and ovens are further segregated by the different functions (microwave oven, conventional ovens or cooking tops) each of which has a distinct utility. The test procedures differ for each function to take into account the differences in cooking. Therefore, the energy factors differ for each function.

DOE has determined that ovens which do not require any manual effort by the consumer to clean provides utility to the consumer. Electric ovens and gas ovens have been segregated into classes of self-cleaning ovens and other than self-cleaning ovens. Self-cleaning ovens tend to have lower efficiencies than other ovens because of the extra energy consumed by the self-cleaning cycle. Since self-cleaning ovens offer a distinct performance-related feature which affects utility and efficiency, DOE is specifying two classes of self-cleaning ovens, one electric and one gas, in order to ensure that such units remain available to customers.

DOE is aware that the efficiency of conventional ovens decreases with increasing volume because of the increase of the volume of the oven relative to the mass of the representative test load. Thus, DOE has accounted for this relationship by proposing energy efficiency levels which decrease linearly with volume. This assures that larger units will not be penalized and that all units must achieve proportionally the same level of energy efficiency improvements. This relationship of efficiency to volume is discussed in detail in the "Engineering Analysis Document," TSD No. 5.

4.7.3 Economic Impacts of the Proposed Standards for Kitchen Ranges and Ovens. Economic benefits and burdens resulting from the proposed standards were assessed from consumer, manufacturer and national perspectives as described in section 5 of this notice. Four alternative levels of standards were evaluated for each perspective, and from this evaluation, the levels proposed in this notice were selected. Impacts resulting from these levels are presented herein. A more detailed presentation on impacts resulting from the levels which were not selected is provided in the "Economic Analysis Document," TSD No. 4.

Consumers

For each class of kitchen ranges and ovens, the average consumer will realize a lower life cycle cost (a decrease in the discounted total cost of product ownership and use) for higher efficiency regulated products as compared with unregulated products. The reduction in life cycle costs ranges from $14 for a self-cleaning gas oven to $90 for gas cooking tops, corresponding to a 3 percent reduction and 17 percent reduction in life cycle costs, respectively.

Consumer payback period, the period of time elapse before the higher purchase price of more energy-efficient products is recouped through reduced energy costs, ranges from 1.6 years for standard electric ovens to 3.4 years for self-cleaning gas ovens.

Manufacturers

Impacts on kitchen range and oven manufacturers resulting from standards at the proposed level were estimated. These effects are presented as the percentage of firms expected to be able to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. Therefore, firms having low probabilities of success will not necessarily fail to meet the standards.

At the proposed level of standards, kitchen range and oven manufacturers estimated to be able to obtain sufficient funds during the 1981 through 1985 period to make the capital investment necessary for January 1986 standards represent approximately 94 percent of current industry production. Included in those firms expected to be able to make the required capital investment are 95 percent of large manufacturers and 94 percent of medium-sized manufacturers. These estimates were developed using analytic techniques which examine the worst case impacts by using conservative assumptions about demand growth, market share, and financing. Details of the analysis are provided in the "Economic Analysis Document," TSD No. 4.

Nation

Burdens and benefits from the national perspective encompass the impacts on consumers and manufacturers. In addition, the national perspective addresses those impacts which affect the collective national welfare. The most direct national impacts resulting from the proposed standards are: estimated energy savings; the discounted dollar value of those

energy savings; the aggregate discounted consumer costs of more energy efficient products; and the net present value of the above costs and benefits.

Proposed standards on all classes of kitchen ranges and ovens combined are estimated to save between 0.26 QBtu's and 0.82 QBtu's during the 1982 through 2005 period, valued between $0.4 billion and $1.0 billion in 1978 dollars. The aggregate increased cost of more energy efficient kitchen ranges and ovens during that same 1982 through 2005 period is between $0.1 billion and $0.3 billion in 1978 dollars. The national net present value of the proposed regulation on kitchen ranges and ovens is estimated at beween $0.3 billion and $0.7 billion in 1978 dollars. These values are derived from use of the Residential Energy Use Forecasting Model described in section 5.3 of this notice and the "Economic Analysis Document," TSD No. 4.

4.8 Central Air Conditioners

4.8.1 Summary. "Central air conditioner" means a consumer product which is powered by single phase electric current, which is rated below 65,000 Btu/hour, which is not contained within the same cabinet as a furnace with a rated capacity above 225,000 Btu/hour, and which is either a "heat pump" or a "cooling only unit."

The proposed energy efficiency levels for central air conditioners are found in Table 4.8–1. Table 4.8–2 presents the alternate efficiency levels selected for analysis for 1981 and 1986. The levels selected for analysis for 1981 are derived from the 1978 shipment weighted energy factor (SWEF)—which is the summation of number of units of a particular basis model multiplied by the energy factor, divided by the total number of shipments within a class—for each class of central air conditioners. Level 2 in 1981 corresponds to the SWEF in 1978. Level 1 is one standard deviation below the SWEF, while Level 3 and Level 4 are 1 and 2 standard deviations above the SWEF, respectively. The levels selected for analysis for 1986 are derived from a manufacturing cost estimating technique used to estimate materials, investment and engineering costs required to market products of higher efficiencies in the 1986 time frame.

Table 4.8–1 Energy Efficiency Levels for Central Air Conditioners (Seasonal Energy Efficiency Ratio, SEER, Btu/Watt-hr).

Product class	July 15, 1981	January 1, 1986
1. Split system, cooling only	7.8	11.0
2. Single package, cooling only.	7.5	10.5
3. Air source, split system, heat pump.	Space reserved.	
4. Air source, single package, heat pump.	Space reserved.	
5. Air source, split system, heating only heat pump.	Space reserved.	

Level 3 in 1986 corresponds to the maximum level which is technologically feasible and economically justified. A detailed explanation on the technological feasibility and economic justifiability can be found in the Engineering Analysis and Economic Analysis Documents, TSD No. 4 and No. 5, respectively. Levels 1 and 2 correspond to proportionally lower levels which have fewer design improvements required and correspond to lower first cost and generally higher life cycle costs. Level 4 corresponds to an advanced technology case which incorporates design options not on the market place in any great quantity or only in prototype stages at this time.

The rationale for selecting the proposed levels appears in sections 4.8.2 and 4.8.3.

Because test procedures have not been finalized for three classes of central air conditioners, space has been reserved for energy efficiency levels for those classes.

Table 4.8–2.—*Alternate Efficiency Levels (Seasonal Energy Efficiency Ratio, SEER, Btu/Watt-hr)*

Product class	Level	1	2	3	4
1. Split system, cooling only	1981	6.2	7.0	7.8	8.6
	1986	9.2	10.1	11.1	
2. Single package, cooling only	1981	6.3	6.9	7.5	8.1
	1986	8.5	9.6	10.7	
3. Air source, split system, heat pump	1981	NA			
	1986				
4. Air source, single package, heat pump	1981	NA			
	1986				
5. Air source, split system, heating only heat pump.	1981	NA			
	1986				

4.8.2 Engineering Analysis.

Methodology

Increased condenser and evaporator surface areas were the energy saving design options considered in the efficiency analysis of central air conditioners. Additional frontal area and condenser depth were considered as well as increased frontal area for the evaporator. By using available larger cabinet sizes or manufacturing a new cabinet beyond the largest 5 ton unit heat transfer was increased. These changes can also be viewed as downsizing the compressor within the existing cabinet and heat exchanger assembly. The two approaches are synonomous. The engineering analysis utilized a component computer model which explicitly treats all major system elements (a detailed discussion of this model is contained in the "Engineering Analysis Document," TSD No. 5). With each change in heat transfer area, air flow volume and compressor capacity were varied in order to maintain the system capacity at the lowest power consumption. Consideration was given to cabinet air flow resistance effects and other nonideal air flow factors. The standard energy consumption of the indoor fan specified in the test procedure for a split system was employed in the analysis. A fixed external resistance on the indoor units was applied to packaged systems. A baseline compressor with an efficiency of 8.86 was employed throughout the analysis. This represents the highest efficiency compressor for which DOE has published performance information.

The manufacturing cost analysis computer performance model predicts the pounds of copper and aluminum required for the improved heat transfer surfaces. The added material costs for a large manufacturer to purchase these materials was then calculated. It is assumed that a small manufacturer would purchase fabricated coils, paying approximately a 10 percent premium. Cost reductions in downsizing the compressor were treated as a function of the reduced capacity. Cost reductions resulted primarily from reduced motor size. The investment necessary to build a new large cabinet, beyond the existing 5 ton cabinet, was assumed to be shared by all units within the product class.

Maximum technologically feasible energy efficiency levels are likely to be achievable through the use of the more

efficient two speed or modulating compressors which varies the output of the unit to correspond to the building load of the dwelling to take advantage of the credit given for this type of system in the test procedure. Industry data was provided for the analysis of the twin compressor performance. The maximum technologically feasible efficiency levels for 1986 for central air conditioners are found in Table 4.8–3.

Table 4.8–3. Maximum Technologically Feasible Levels for Central Air Conditioners (Seasonal Energy Efficiency Ratio, SEER, Btu/Watt-hr).

Project class	Level
1. Split system, cooling only	14.0
2. Single package, cooling only	13.0
3. Air source, split system, heat pump	N/A
4. Air source, single package, heat pump	N/A
5. Air source, split system, heating only heat pump	N/A

Test Procedures

The test procedures for central air conditioners found at 10 CFR Part 430, Subpart B, provide a standard method for testing to determine the efficiency of central air conditioners by measuring the cooling and heating capacities and electric energy consumption of central air conditioners at standard test conditions. The measure of efficiency accounts for such factors as oversizing, cycling of the unit when the building load is less than the output of the unit, hours of operation at different climatic conditions, and actual operating controls of the particular unit being tested. The measure of efficiency of central air conditioners, cooling mode (seasonal energy efficiency ratio, SEER) is defined as the total cooling provided in Btu's divided by the total electrical energy consumed in Watt-hours in a normal cooling season. The measure of heating efficiency for central air conditioners in the heating mode (heating seasonal performance factor, HSPF) is defined as the total heating in Btu's, divided by the total electric energy consumed in Watt-hours in a normal heating season.

No comments specifically relating to test procedures for cooling only central air conditioners were received in response to the advance notice; however, the test procedure has been recently revised (44 FR 76700, December 17, 1979) to include testing procedures for heating and cooling performance of heat pumps. This amendment included minor changes to the testing procedures for cooling only central air conditioners; no measurable differences in SEER resulted from the revision. Thus, existing test data on SEER remains accurate and has been used to determine the energy efficiency levels for cooling only units in today's proposed rule.

Individual Product Class Analysis

In the advance notice, DOE segregated cooling only central air conditioners into two classes according to whether the unit is designed as a single package or as a split system with separate indoor and outdoor components connected by refrigeration and electrical lines. Several comments were received in response to these suggested classes. One commenter stated that since both types of cooling only central air conditioners serve the same function, they should be combined into a single class. The commenter stated that in the construction industry, split systems and single package units are competitors and are used almost interchangeably, and that split systems can be used almost in any place that package units are used. Consequently, to create two separate standards for these products because of a few isolated situations would not maximize energy savings.

DOE has reviewed this comment and has determined that single package units and split systems units should not be combined into one class. Combining the two classes would adversely impact single package units which are inherently less efficient due to space limitations and size constraints. Efficiency improvements to go to the same level of standards are not cost justified as single package units have higher associated costs than split systems units. DOE today proposes separate classes for single package and split system central air conditioners.

Another commenter stated that DOE should establish additional classes of cooling only central air conditioners based on capacity since industry data indicate that products at the lower and upper end of the capacity range tend to be less efficient. DOE and NBS have concluded that there is no fundamental technical reason which causes these decreases in product efficiency. It is possible to design high and low capacity models to have efficiencies equal to models of medium capacity, and DOE is not aware of any noticeable decrease in product utility that would result therefrom.

The commenter stated that single package cooling equipment and combination heating and cooling equipment may typically be less efficient than split system cooling only. No data were supplied by the commenter to substantiate this claim. DOE has concluded that these units are nearly always designed as single package units and that the separate class proposed for single package units is adequate to account for any possible differences in efficiency of these units.

A final comment was received from a manufacturer of a single-package air conditioning system that utilizes a high pressure and high velocity air distribution system. The commenter stated that because of his specific design, he is unable to attain cooling efficiencies as high as lower velocity cooling equipment can attain. The commenter also stated that losses in his prefabricated duct system were substantially less than those incurred by normal ductwork for low-velocity distribution systems. DOE has reviewed the comments and has determined that the commenter may have a valid argument. However, in the absence of any data or further design information, DOE cannot verify the comments. DOE has addressed this issue by amending the test procedures by granting waivers for unique designs that cannot be measured by the existing procedures (45 FR 14188, March 4, 1980).

Five classes of central air conditioners are specified in section 4.8.1 of this notice. These classes are distinguished by performance related features which affect both efficiency and utility. Central air conditioners are segregated between units which only provide cooling (cooling only units) and which may also provide heating (heat pumps). Because the test procedure for heat pumps was prescribed on December 27, 1979, the effective date for implementation is June 24, 1980; today's notice, therefore, assigns "space reserved" to all three classes of heat pumps: air source, split system heat pump; air source, single package heat pump; and air source, heating only heat pump.

Cooling only central air conditioners have been further segregated into single package and split system cooling only units. These units have specific utility based on space availability and on the physical location of the units. Architectural considerations of certain residences either do not allow or do not have outdoor space to install the outdoor unit of a split system. When this occurs, a different type of unit must either be mounted through the wall or in the attic of a house. Improvements in efficiency for single package units are limited due to size constraints (maximum wall and ceiling openings) which impact product design. These design limitations are discussed in the "Engineering Analysis Document," TSD No. 5. For these reasons DOE has determined that it is necessary to propose separate classes for split

system and single package central air conditioners.

4.8.3 Economic Impacts of the Proposed Standards for Central Air Conditioners. Economic benefits and burdens resulting from the proposed standards were assessed from consumer, manufacturer and national perspectives as described in section 5 of this notice. Four alternative levels of standards were evaluated for each perspective and from this evaluation, the levels proposed in this notice were selected. Impacts resulting from these levels are presented herein. A more detailed presentation on impacts resulting from the levels which were not selected is provided in the "Economic Analysis Document," TSD No. 4.

Consumers

For each class of central air conditioners, the average consumer will realize a lower life cycle cost (a decrease in the discounted total cost of product ownership and use) for higher efficiency regulated products as compared with unregulated products. The reduction in life cycle costs range from $303 for split system central air conditioners to $429 for single package central air conditioners corresponding to an 11 percent reduction and 15 percent reduction in life cycle costs, respectively.

Consumer payback period, the period of time elapsed before the higher purchase price of more energy-efficient products is recouped through reduced energy costs, ranges from 2.6 years for single package air conditioners to 5.7 years for split system central air conditioners.

Manufacturers

Impacts on central air conditioner manufacturers resulting from standards at the proposed level were estimated. These effects are presented as the percentage of firms expected to be able to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. Therefore, firms having low probabilities of success will not necessarily fail to meet the standards.

At the proposed level of standards, central air conditioner manufacturers estimated to be able to obtain sufficient funds during the 1981 through 1985 period to make the capital investment necessary for January 1986 standards represent approximately 99 percent of current industry production. Included in those firms expected to be able to make the required capital investment are 99 percent of large manufacturers, 99 percent of medium-sized manufacturers, and 96 percent of small manufacturers. These estimates were developed using analytic techniques which examine the worst case impacts by using conservative assumptions about demand growth, market share and financing. Details of the analysis are provided in the "Economic Analysis Document," TSD No. 4.

Nation

Burdens and benefits from the national perspective encompass the impacts on consumers and manufacturers. In addition, the national perspective addresses those impacts which affect the collective national welfare. The most direct national impacts resulting from the proposed standards are: estimated energy savings; the discounted dollar value of those energy savings; the aggregate discounted consumer costs of more energy efficient products; and the net present value of the above costs and benefits.

Proposed standards on all classes of central air conditioners combined are estimated to save between 2.62 QBtu's and 3.73QBtu's during the 1982 through 2005 period, valued between $4.1 billion and $4.3 billion in 1978 dollars. The aggregate increased cost of more energy efficient central air conditioners during that same 1982 through 2005 period is between $3.3 billion and $3.9 billion in 1978 dollars. The national net present value of the proposed regulation on central air conditioners is estimated at between $0.4 billion and $0.8 billion in 1978 dollars. These values are derived from use of the Residential Energy Use Forecasting Model described in section 5.3 of this notice and the "Economic Analysis Document," TSD No. 4.

4.9 Furnaces

4.9.1 Summary. "Furnace" means a device, utilizing only single-phase electric current in the case of electric furnaces and boilers, single-phase electric current in conjunction with either natural gas, propane, or home heating oil in the case of gas and oil forced air furnaces and gas, and oil boilers, or only gas in the case of gravity central furnaces, which is designed to be the principal heating source for the living space of a residence and which is not contained within the same cabinet with a central air conditioner of a rated cooling capacity in excess of 65,000 Btu's per hour. A furnace is either an electric central furnace, electric boiler, forced air central furnace, gravity central furnace, or low pressure steam or hot water boiler. The heat input rate of a furnace is less than 300,000 Btu's per hour for electric boilers and low pressure steam or hot water boilers, and less than 225,000 Btu's per hour for forced air central furnaces, gravity central furnaces and electric central furnaces.

The proposed energy efficiency levels for furnaces are found in Table 4.9–1. Table 4.9–2 presents the alternate efficiency levels selected for analysis for 1981 and 1986. The levels selected for analysis for 1981 are derived from the 1978 shipment weighted energy factor (SWEF)—which is the summation of number of units of a particular basic model multiplied by the energy factor, divided by the total number of shipments within a class—for each class of furnaces. Level 2 in 1981 corresponds to the SWEF in 1978. Level 1 is one standard deviation below the SWEF, while Level 3 and Level 4 are 1 and 2 standard deviations above the SWEF, respectively. The levels selected for analysis cost estimating technique used to estimate materials, investment and engineering costs required to market products of higher efficiencies in the 1986 time frame. Level 3 in 1986 corresponds to the maximum level which is technologically feasible and economically justified. A detailed explanation on the technological feasibility and economic justifiability can be found in the Engineering Analysis and Economic Analysis Documents, TSD No. 4 and No. 5, respectively. Levels 1 and 2 correspond to proportionally lower levels which have fewer design improvements required and correspond to lower first cost and generally higher life cycle costs. Level 4 corresponds to an advanced technology case which incorporates design options not on the market place in any great quantity or only in prototype stages at this time.

Table 4.9–1 Energy Efficiency Levels For Furnaces (Annual Fuel Utilization Efficiency, AFUE, percent).

Product class	July 15, 1981	January 1, 1986
1. Electric	No standard.	No standard.
2. Gas gravity	No standard.	No standard.
3. Gas, forced air, indoor	65	81
4. Gas, forced air, outdoor nonweatherproof horizontal.	56	74
5. Gas, forced air, outdoor other than nonweatherproof.	68	76
6. Gas boiler, indoor	65	79
7. Gas boiler, outdoor	No standard.	No standard.
8. Oil, forced air, indoor	75	80
9. Oil, forced air, outdoor	71	78
10. Oil boiler, indoor	78	82
11. Oil, boiler, outdoor	No standard.	No standard.

Table 4.9-2.—*Alternate Efficiency Levels (Annual Fuel Utilization Efficiency, AFUE, Percent)*

Product class	Level	1	2	3	4
1. Electric	1981				
	1986				
2. Gas gravity	1981				
	1986				
3. Gas, forced air, indoor	1981	81	85	80	73
	1986	67	73	81	
4. Gas, forced air, outdoor, nonweatherproof horizontal	1981	52	58	80	65
	1986	55	70	74	
5. Gas, forced air, outdoor, other than nonweatherproof.	1981	65	68	71	73
	1986	70	72	76	
6. Gas boiler, indoor	1981	62	65	68	71
	1986	67	73	79	
7. Gas boiler, outdoor	1981				
	1986				
8. Oil, forced air, indoor	1981	73	75	78	81
	1986		75	80	
9. Oil, forced air, outdoor	1981	69	71	73	75
	1986	70	73	78	
10. Oil boiler, indoor	1981	74	76	78	80
	1986	78	80	82	
11. Oil boiler, outdoor	1981	74	75	76	76
	1986				

The rationale for selecting the proposed levels appears in sections 4.9.2 and 4.9.3.

No energy efficiency standards are proposed today for the following classes of furnaces: electric; gas gravity; gas boiler, outdoor; and oil boiler, outdoor. Electric furnaces currently operate at or about 100% efficiency because all the electric energy is transferred into the conditioned space. Losses due to inefficient motors and improvements achieved by added insulation are taken into account because the test procedures assume that all standby losses are usable heat for the dwelling. Thus, DOE has determined that it is not technologically feasible to propose energy efficiency standards for this class of furnaces. For the other 3 classes there presently exist such a limited production that DOE has determined that standards are not economically justified for these classes and no significant energy conservation, as discussed in section 10.5, can be realized by imposing standards on these classes of products.

4.9.2 Engineering Analysis.

Methodology

In performing the efficiency analysis, the following design options were applied as appropriate:

- increased heat exchanger surface area;
- intermittent ignition device to replace standing pilot;
- stack damper to reduce standby losses;
- power burner or power unit; and
- retention head burner.

The analysis of the various product classes was completed using a computer model coupled with experimental data from various sources and engineering analysis. A technical discussion of the calculations used to estimate the efficiency improvements from use of these design options is contained in the "Engineering Analysis Document," TSD No. 5.

The manufacturing cost analysis assumed a certain number of large manufacturers and small manufacturers for each product class. These were:

- gas-warm air furnaces—three large manufacturers; ten small manufacturers;
- gas boilers—four large manufacturers; four small manufacturers;
- oil warm air furnaces—three large manufacturers; four small manufacturers;
- oil boilers—four manufacturers; four small manufacturers;
- gas horizontal units (nonweatherproof)—three large manufacturers; ten small manufacturers; and
- gas outdoor weatherproof units—three large manufacturers; ten small manufacturers.

The number of production lines were not estimated for furnaces as implementation of the design options required only tooling changes and these were based on the number of units which could be produced per year on a single tool.

Most design options required mounting of a purchased part, such as a stack damper, intermittent ignition device, power burner or power vent, or a retention head burner. Implementation of these designs at most a small amount of tooling for mounting brackets, additional labor for installation, and the cost of the purchased part.

Increasing the heat exchanger surface area is an example of a major design option which was costed. This could be done by derating the unit, i.e., reducing the burner input rate per unit of heat exchanger area; or the surface area could be increased by enlarging the existing heat exchanger. For gas-fired units, the heat exchanger was considered to be common to all models and the tooling costs were therefore amortized over the complete product line. Cabinet changes were also considered. For typical large and small manufacturers an estimate was made of the number of models produced in order to estimate the tooling requirements for cabinet design changes. These various costs amortized on a per unit basis were used to develop estimates of the cost efficiency relationship for each product class. These relationships are explained in the "Engineering Analysis Document," TSD No. 5.

The maximum technologically feasible energy efficiency levels for furnaces are found in Table 4.9–3. The maximum technologically achievable efficiency levels are obtained by use of a condensing mode of operation which removes latent heat from flue gases. This requires a major redesign in the final section of the heat exchangers, coupled with a forced draft burner system such as the use of a power vent, power burner, or pulsed combustion. New corrosion resistant materials will be required and a complete furnace package will have to be redesigned. The impact of this will be highly dependent on the present design and manufacturing procedures for individual manufacturers, but in all cases it will require substantial investment in capital equipment and tooling.

Table 4.9.3. Maximum Technologically Feasible Levels for Furnaces (Annual Fuel Utilization Efficiency, AFUE, percent).

Product class	Level
1. Electric	N/A
2. Gas gravity	N/A
3. Gas, forced air, indoor	94
4. Gas, forced air, outdoor, nonweatherproof horizontal	92
5. Gas, forced air, outdoor, other than nonweatherproof	92
6. Gas boiler, indoor	96
7. Gas boiler, outdoor	N/A
8. Oil, forced air, indoor	94

Product class	Level
9. Oil, forced air, outdoor	92
10. Oil boiler, indoor	86
11. Oil boiler, outdoor	N/A

Test Procedures

The test procedures for furnaces found at 10 CFR Part 430, Subpart B, provide a standardized method to determine the efficiency (annual fuel utilization efficiency, (AFUE) of furnaces by measuring the characteristic losses of the furnace.

Comments expressed concern that the standards might be set at a level which would affect the reliability and safety of furnaces. DOE has analyzed only design options that can be incorporated into the product without reducing its reliability or safety.

Comments were received which suggested that the furnace test procedures should be amended in order to adequately account for electrical energy consumed by gas and oil furnaces. DOE furnace test procedures do account for the electrical energy consumed by fossil-fueled furnaces in the calculations required for determining the annual operating cost. However, the measure of efficiency in the existing test procedure does not account for the efficiency performance of electrical components. DOE has sought to develop a new efficiency measure which will reflect differences in electrical energy consumption. Accordingly, DOE has proposed such an efficiency measure in an amendment to the furnace test procedure published in the Federal Register of January 4, 1980 (45 FR 1298).

One comment expressed concern that the present DOE furnace test procedures provide a credit for dampers on indoor furnaces but do not provide the same credit for dampers on outdoor furnaces. The primary savings for dampers is the reduction in infiltration losses. Because of the use of outdoor air in the combusition process, these losses are assigned a zero value in the test procedures for units installed outdoors. Therefore, the overall evaluation of indoor and outdoor units is correct as prescribed in the final furnace test procedures.

DOE has learned that some manufacturers, through testing experience, have questioned the test procedures which they feel should be expanded or changed. A number of cases in point have been the subject of applications for exception to DOE's Office of Hearings and Appeals (OHA). On the basis of information submitted by applications to OHA, comments submitted by manufacturers and other available information, DOE issued an advance notice on May 29, 1979 (44 FR 30978), to amend the furnace test procedures to include procedures for testing two new furnace designs—pulse combustion furnaces and condensing furnaces—and to incorporate the provisions of the Exceptions granted by OHA.

In the proposed amendments to the furnace test procedures, DOE is proposing procedures for testing pulse combustion and condensing furnaces which DOE has included in its analysis of maximum technologically feasible level of efficiency for furnaces. The remaining issues discussed in the proposed amendments are minor technical improvements, and the values of AFUE derived from the proposed amendment will be consistent with prior test results.

Individual Product Class Analysis

Four comments recommended that the classes for furnaces recognize the configuration and location of the unit (up flow, down flow, forced air, boiler and furnace), while two comments urged that furnaces and boilers should not be segregated into separate classes. Three comments suggested that classes be set for indoor and outdoor applications.

Eleven classes of furnaces are specified in section 4.9.1 of this notice. These classes are distinguished either by the type of fuel consumed or by performance-related features which affect utility and efficiency.

One performance-related feature affecting utility is the method of heat distribution to the household. Gas furnaces use air circulation systems based either on the effect of gravity on low density hearted air or on the action of a blower (i.e., forced air). Gravity type systems offer the utility of operating without an electrical connection. In addition, another category of furnaces, gas boilers, uses hot water or steam to distribute heat. These various heat distribution systems result in different characteristics of heat transfer from the furnace combustion chamber to the conditioned space and different losses through the flue. Because of the above factors, the measures of efficiency of gravity gas furnaces tend to be lower than the measure of efficiency of forced air gas furnaces. Also, the measure of efficiency of gas forced air furnaces tend to be lower than the measure of efficiency for gas boilers. Identical arguments lead to separate classes for forced air oil furnaces and oil boilers. A class of oil furnaces using gravity to circulate hot air is not specified because DOE is not aware of any such units distributed in commerce.

Another distinct utility which affects efficiency is whether the basic model is installed indoors or outdoors. In the test procedures, outdoor installed units have their jacket heat losses evaluated and these losses are deducted from the efficiency rating. This efficiency deduction is justified by the architectural utility that may be afforded a consumer by outdoor models. The efficiency of direct vent units is evaluated in the test procedures on a similar basis as outdoor units. The test data are corrected for the use of outdoor air for combustion and infiltration losses are not deducted when evaluating indoor direct vent and outdoor models. However, the difference in efficiency between direct vent units compared to other similar indoor units is negligible because the effects of heating outdoor air for combustion and low infiltration losses are offsetting.

Another utility feature which affects efficiency is the horizontal configuration of some models of outdoor forced air gas furnaces. This horizontal configuration results in less efficient heat transfer than other configurations but has the utility of being uniquely adaptable to attics and crawl spaces. Therefore, separate classes of gas horizontal furnaces are proposed to prevent the possible elimination of this type of configuration from the market. Also, it was determined that horizontal units with weatherproof cabinets have fewer dimensional constraints than nonweatherproof horizontal units which are typically installed in attics or crawl spaces. However, no significant difference in efficiency is evident for weatherproof horizontal basic models when compared to any other outdoor model. DOE has determined that there exists no utility associated with horizontal units when installed indoors. Therefore, since an attic or crawl space is considered an outdoor installation in the DOE test procedures because it is not in the conditioned space, only outdoor nonweatherproof horizontal furnaces are identified as those having justifiable reduced performance.

4.9.3 Economic Impacts of the Proposed Standards for Furnaces. Economic benefits and burdens resulting from the proposed standards were assessed from consumer, manufacturer and national perspectives as described in section 5 of this notice. Four alternative levels of standards were evaluated for each perspective, from this evaluation, the levels proposed in this notice were selected. Impacts resulting from these levels are presented herein.

A more detailed presentation on impacts resulting from the levels which were not selected is provided in the "Economic Analysis Document," TSD No. 4.

Consumers

For each class of furnaces, the average consumer will realize a lower life cycle cost (a decrease in the discounted total cost of product ownership and use) for higher efficiency regulated products as compared with unregulated products. The reduction in life cycle costs range from $62 for oil, forced air, to $624 for gas, indoor boilers, corresponding to a .5 percent reduction and 9 percent reduction in life cycle costs, respectively.

Consumer payback period, the period of time elapsed before the higher purchase price of more energy-efficient products is recouped through reduced energy costs, ranges from 0.25 years for oil, forced air, indoor furnaces to 2.7 years for gas, forced air, indoor furnaces.

Manufacturers

Impacts on furnace manufacturers resulting from standards at the proposed level were estimated. These effects are presented as the percentage of firms expected to be able to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards. Those firms not able to successfully finance compliance with standards by means of funds from earnings or loans may be able to use other methods such as sales of stocks or bonds, transfer of funds from other operating divisions, etc. Therefore, firms having low probablilities of success will not necessarily fail to meet the standards.

At the proposed level of standards, furnace manufacturers estimated to be able to obtain sufficient funds during the 1981 through 1985 period to make the capital investment necessary for January 1986 standards represent approximately 99 percent of current industry production. Included in those firms expected to be able to make the required capital investment are 99 percent of large manufacturers, 98 percent of medium-sized manufacturers, and 95 percent of small manufacturers are expected to be able to make the required capital investment. These estimates were developed using analytic techniques which examine the worst case impacts by using conservative assumptions about demand growth, market share and financing. Details of the analysis are provided in the "Economic Analysis Document," TSD No. 4.

Nation

Burdens and benefits from the national perspective encompass the impacts on consumers and manufacturers. In addition, the national perspective addresses those impacts which affect the collective national welfare. The most direct national impacts resulting from the proposed standards are: estimated energy savings; the discounted dollar value of those energy savings; the aggregate discounted consumer costs of more energy efficient products; and the net present value of the above costs and benefits.

Proposed standards on all classes of furnaces combined are estimated to save between 2.0 QBtu's and 4.27 QBtu's during the 1982 through 2005 period, valued between $3.5 billion and $5.1 billion in 1978 dollars. The aggregate increased cost of more energy efficient furnaces during that same 1982 through 2005 period is between $1.0 billion and $1.7 billion in 1978 dollars. The national net present value of the proposed regulation on furnaces is estimated at between $2.5 billion and $3.4 billion in 1978 dollars. These values are derived from use of the Residential Energy Use Forecasting Model described in section 5.3 of this notice and the "Economic Analysis Document," TSD No. 4.

5. Economic Impact Analysis

5.1 Introduction

A regulation prescribing energy efficiency standards for consumer products will result in impacts on both consumers and manufacturers of these products. Consumers will experience the following impacts: (1) higher purchase price; and (2) lower energy cost of operation. Some manufacturers will experience: (1) retooling and equipment costs; (2) changes in sales volume; and (3) changes in sales revenue.

In addition, there will be national impacts. These impacts include: (1) changes in gross national product; (2) changes in energy consumption; and (3) changes in income distribution and employment. The standard levels selected represent tradeoffs that were made among impacts in order to realize the largest energy savings coupled with the least disturbance of any particular sector of the economy.

5.1.1 Impact Estimates for Proposed Standard Levels. Evaluation of the many alternative levels of standards for each class of consumer product resulted in the selection of preferred alternatives. These alternatives have been shown to be technologically feasible and economically justified by the impact analyses which are presented in the "Economic Analysis Document," TSD No. 4. Summaries of specific product impacts of the proposed standard levels for consumers, manufacturers and the Nation can be found in section 4 of this notice.

For all products combined, the proposed standards are estimated to save between 13.64 QBtu's and 24.87 QBtu's during the 1982 through 2005 period, valued between $22.4 billion and $29.4 billion in discounted 1978 dollars. The aggregate increased cost of more energy efficient products during that same period will be between $7.3 billion and $10.2 billion in discounted 1978 dollars. The national net present value of proposed standards on all product types combined is estimated to be between $15.1 billion and $19.2 billion in 1978 dollars.

For the remaining national impact indicators such as change in gross national product, inflation, balance of trade, inflation and employment, there is negligible impact. In addition, the differential impacts across consumer income groups are negligible. A detailed analysis of these impacts is presented in the "Economic Analysis Document," TSD No. 4.

5.1.2 Purpose, Scope and Methodology. The purpose of the economic analysis was to determine whether or not a standard was economically justified and if the benefits of the standard exceed the burdens. This analysis was based upon the seven factors in section 325(d) of the Act and listed in section 1.2.2 of this notice.

The application of these legislative criteria required that the impacts on consumers, manufacturers and the Nation be quantified. The analysis separately addressed impacts from all three perspectives and then integrated the results. Economic efficiency tests, which evaluate the magnitude of impacts resulting from energy efficiency standards regulations, were applied from the perspective of consumers, manufacturers and the Nation as a whole. Equity tests, which assess how these impacts are shared across consumer groups, different sized manufacturers and geographical regions, were also applied.

Each alternative energy efficiency level of a standard was assessed to determine the magnitude of any of the following impacts:

- changes in life cycle cost (LCC) to the consumer; [1]

[1] Life cycle cost is a measure of the total cost of consumer product ownership represented by the summation of product purchase cost, and maintenance and operating expenses over service life of the product, discounted to their present values.

• the distribution of costs and benefits among consumer groups;
• the distribution of costs and benefits between regions;
• loss of economic efficiency by manufacturers;
• the distribution of economic efficiency effects among manufacturer groups, especially those with less than $8 million in sales; and
• exposure of any particular group of manufacturers, especially those with sales under $8 million annually, to greater risk of financial failure.

Alternative energy efficiency levels were ranked in accordance with each of the impact measures above, including national energy savings and national net present value.

5.1.3 Relationship of Analysis to Legislative Criteria. The seven legislative criteria identified were quantitatively applied in the economic analysis as follows:

(1) Economic Impact on Consumers and Manufacturers. The economic impacts of standards on consumers were quantified by calculating consumer payback, consumer life cycle costs and the dispersion of these life cycle costs across income groups. Standards that potentially imposed a greater life cycle cost than currently exists were dropped from consideration. Additionally, any standard that could produce an inequitable burden on lower income groups was given special attention. The economic efficiency impacts of the standards on manufacturers were assessed through estimation of changes in the ratio of profit to net worth. Equity impacts on manufacturers were measured by analyzing shifts in the distribution of profit/net worth for manufacturers of varying sizes and any changes in the likelihood of firm failure. In addition, the ability of individual manufacturers to generate sufficient funds to make capital investment for 1986 standards was assessed.

(2) Cost Savings. Changes in national net present value and consumer life cycle costs were calculated. Any standard that did not lead to aggregate cost savings was eliminated from further consideration.

(3) Energy Savings. Baseline projections of energy use were compared to calculations of energy use under energy efficiency standards. Any standard that did not produce a net energy savings compared with the baseline was eliminated from further consideration.

(4) Utility or Performance. Consideration was given to various performance and utility features in making product class selections. The analysis addressed only those standards which ensured the existence of products having essential consumer utility characteristics, as determined by DOE.

(5) Lessening of Competition. Impacts on competition were measured by calculating any change in the likelihood of firm failure resulting from the imposition of a standard. If the likelihood of failure was great, the standard was eliminated from further consideration.

(6) Need of the Nation to Conserve Energy. Consideration of the Nation's need to conserve energy was incorporated in the economic methodology by ranking alternative standard levels by their national energy savings.

(7) Any Other Factors the Secretary of DOE Considers Relevant. The analysis addressing the above six criteria was expanded upon by estimating any resulting changes in income distribution, the distribution of life cycle costs across regions, gross national product, inflation, balance of trade and employment.

5.2 Value Model Overview

The Value Model is a computer program developed to evaluate alternative standard levels in accordance with regulatory guidelines and requirements in the Act. It was developed so that the economic impacts of regulation could be systematically compared, evaluated and sequentially ranked. It is organized by group perspective (consumer, manufacturer and Nation) and type of impact (economic efficiency, equity).

Impact measures incorporated within the model include:

Consumer

• Consumer life cycle costs
• Consumer payback
• Consumer income inequality coefficient

Manufacturer

• Average manufacturer profit to net worth ratio
• Interquartile shifts in manufacturer profit to net worth ratios
• Availability of funds during the 1981 to 1985 period required to make capital investments for 1986 standards.

Nation

• Macro economic variables such as gross national product, balance of trade, inflation, and employment
• Regional life cycle cost changes
• National energy savings
• National net present value.

The Value Model was run in two phases. In the first phase the effect of standards on the various impact measures was calculated. In the second phase, the acceptability of these impacts was evaluated. Its output included a list of acceptable options prioritized by energy savings and impacts on consumers, manufacturers and the Nation. For a more detailed discussion of this analysis, the reader is referred to the "Economic Analysis Document," TSD No. 4.

5.2.1 Consumer Perspective. The consumer impacts of alternative energy efficiency levels were calculated by estimating both the level of induced costs and benefits and their distribution across different income groups and regions.

Identification of Decision Making Criteria

Consumer impacts were measured by the net benefits to consumers who purchase and operate energy efficient consumer products. Benefit for this analysis was defined as the savings in life cycle costs accruing to consumer product owners. Decision making criteria for consumer impacts included: the average LCC savings resulting from energy efficiency improvements in consumer products; the specific impacts of these savings on different consumer groups; the payback period for recouping the increased purchase cost of more efficient products; and changes in disposable consumer income.

5.2.2 Manufacturer Perspective. The Value Model incorporated the potential effects of consumer product efficiency regulations on the financial posture of manufacturers. In developing the impact indicators, consideration was given to: assets, liabilities, market share, profitability, and gross sales.

Identification of Decision Making Criteria

The impact of regulation on manufacturers was reflected in changes to costs and revenues. These impacts resulted from changes in capital costs, material costs, borrowing costs, sales volumes and sales prices. The measure representing manufacturer economic efficiency impacts was percent change in the profit to net worth ratio. This ratio incorporated the entire spectrum of financial calculations including various cost items, as well as capital acquisition and debt effects.

Manufacturer equity was considered in two ways: first, as a measure of how economic efficiency impacts are shared among manufacturers; and second, as a measure of the change in exposure to failure resulting from regulation-linked changes in a firm's financial position. In both measures, the industry was segmented into small, medium, and large

firms, with a comparison made to determine whether an unfair distribution of burdens could exist between different groups. Furthermore, assessment was made of the percentage of firms unable to obtain sufficient funds through profit or short-term debt, during the 1981 through 1985 period, to make the capital investment necessary for January 1986 standards.

5.2.3 Nation's Perspective. National impacts of consumer product efficiency standards encompass all consumer and manufacturer impacts. In addition, the national perspective considers those factors which affect the future well being of society in the United States as a whole (i.e., inflation, gross national product, balance of trade, etc.).

Identification of Decision Making Criteria

The impacts of standards flow through the economy to effect such national indicators as gross national product, inflation, balance of trade and employment. The Value Model assesses these impacts and displays their magnitudes. In addition the Value Model estimates the total energy savings and the national net present value resulting from alternative levels of standards. (A detailed presentation of this analysis can be found in the "Economic Analysis Document," TSD No. 4.) These latter two indicators serve as the criteria by which otherwise acceptable alternatives were sequentially ranked. The net present value is calculated as the discounted value of energy savings minus the discounted total cost of increased product prices and Federal costs. The energy savings indicator measures the total amount of energy savings attributable to consumer product energy efficiency improvements.

5.3 Economic Sub-Models Within The Value Model.

The Value Model organizes estimates of regulatory impacts into a framework for sequentially ranking alternative energy efficiency levels. The estimates of various impact measures are provided by the various sub-models described below.

The Residential Energy Use Forecasting Model calculates total energy use, by product type and fuel type, over the period 1982–2005. Estimates of energy use with and without standards are compared to assess the energy savings attributable to alternative energy efficiency standards. The model incorporates technological and behavioral effects in predicting future energy demand.

EXPLOR, a national econometric/input-output model, was used to estimate the effects of alternative standards on employment, inflation, gross national product and balance of trade. To estimate the impacts of regulation, certain input data were fed into the model. The key data were: direct energy savings (provided by the energy use model), demographic projections, discount rates and changes in costs and materials. With these inputs, the EXPLOR model calculates how economic impacts on the industrial and residential sector, directly affected by proposed standards, interact with the rest of the economy. The model traces the various regulatory impacts through the different sectors and aggregated them into summary estimates of changes in: GNP ($), inflation (%), balance of trade ($), and employment (numbers of jobs). Impacts were projected for the 1982 through 2000 period.

Impacts of consumer product efficiency standards on manufacturers of consumer products were estimated using two principal models: (1) the Dispersion Model, which analyzes how many product models, shipments, and revenues are lost at each level of regulation, and (2) the Financial Model, which analyzes the financial and business impact on manufacturers. Both models are fully described in the "Economic Analysis Document," TSD No. 4. For each alternative standard level, the revenue loss resulting from the loss of noncompliant product lines was derived using the Dispersion Model. The resulting loss of revenue is used as input to the Financial Model. That model analyzes the percentage of manufacturers usable to maintain financial health without resorting to untenable levels of debt, change of ownership or closure.

Life cycle costs and payback were analyzed by varying energy prices, discount rates, product usage rates, efficiency factors, and capital costs to determine through sensitivity analysis the relative impacts on the consumer.

Life cycle costs and payback were analyzed by varying energy prices, discount rates, efficiency factors, and capital costs to determine through sensitivity analysis the relative impacts on the consumer.

5.4 Economic Impacts of Regulation.

5.4.1 Selection of Alternative Levels for Analysis. DOE is proposing time-phased standards for each product class. A preliminary standard level is being proposed for implementation in July 1981, and a final standard level is proposed that will take effect on January 1, 1986.

In the determination of 1981 standards, four trial levels of analysis were defined for each product class. For each such class a sales weighted efficiency factor for 1978 was determined from industry survey data. This SWEF defined the second level for analysis of each class. The first level of analysis was determined by subtracting the 1978 standard deviation of the efficiency factor from the SWEF. Levels three and four were determined respectively by adding one and two standard deviations to the SWEF. The sales weighted efficiency factor (SWEF) was defined as follows:

$$SWEF = \frac{\sum_{i=1}^{N} (SW_i)(EF_i)}{\sum_{i=1}^{N} SW_i}$$

where N = number of appliance models
i = i^{th} model
SW_i = shipments of the i^{th} model
EF_i = energy factor of the i^{th} model.

Standard deviation (SD) was calculated as follows:

$$SD = \left[\frac{\sum_{i=1}^{N} SW_i (SWEF - EF_i)^2}{\sum_{i=1}^{N} SW_i}\right]^{1/2}$$

The four trial levels utilized in the analysis of alternative 1986 product class standards were derived as follows:

- level four was based on implementation of advanced energy efficiency technologies (equipment designs not widely available in commerce)
- level three was near the maximum product class efficiency factor considered to be attainable through conventional technologies (equipment designs widely available in commerce)
- levels two and one were derived by scaling down level three. This scaling down represented DOE's judgment regarding alternative burdens on manufacturers and was taken to provide a lower bound for choosing the preferred alternative.

5.5 Acceptability Criteria Used for Standards Selection.

The Value Model provides a display of equity and economic efficiency

impacts, as discussed above. As estimates of these impacts were viewed as a whole, a range of suitable trade-offs emerged. These trade-offs provide the criteria by which certain alternative energy efficiency levels were classified as unacceptable. A complete description of these acceptability criteria, or thresholds, can be found in the "Economic Analysis Document," TSD No. 4. To summarize some of the principal thresholds, a level of standard is acceptable only if: product life cycle costs are reduced; energy savings accrue; national net present value is positive; and the ability of the industry to effectively compete is preserved.

6.0 Certification and Enforcement

6.1. Introduction

Industry compliance with energy efficiency standards will be assured through a two part program approach of certification and enforcement activities. Certification is the process whereby a manufacturer by means of testing in accordance with DOE procedures, prior to commercial distribution, insures that the product complies with the energy efficiency standard. The manufacturer certifies compliance by filing a statement of compliance based on such testing with DOE. Enforcement involves all subsequent DOE activities or manufacturer requirements which insure that the continued production of a manufacturer remains in compliance with the standard.

6.1.1 *Alternative Certification and Enforcement Approach.* Four alternative approaches to consumer product certification and enforcement were developed and investigated. These included:

(a) A Minimum Government Intervention;

(b) A Strong Certification Control;

(c) A Strong Enforcement Audit;

(d) A Mixed Certification and Enforcement.

Each of the four approaches are present in a wide range of public and private standards programs. The first approach represents the lowest level of direct Federal intervention into the consumer product industry but limits DOE's control of assuring that all products distributed in commerce are in compliance with applicable energy efficiency standards. The remaining three approaches represent a larger level of effort, each placing the major program emphasis on different stages of the certification and enforcement process.

The second approach emphasizes the certification process and provides assurances of compliance before products are distributed in commerce. The third approach emphasizes the enforcement process by stressing continuing test and record audits of post-certification production. The fourth approach represents a mix between the second and third approaches, distributing the emphases between the roles of certification and enforcement audit activities.

The selection criteria used in evaluating the four certification and enforcement approaches included an assessment of anticipated impacts on and associated costs of the program (to the Federal government, industry and commerce), the likelihood of discovering noncompliant products and consequent impact on the anticipated level of compliance.

These approaches are discussed in detail in TSD No. 3, "Certification and Enforcement Analysis."

6.1.2 *Proposed Certification and Enforcement Approach.* The certification and enforcement portion of the rule being proposed today is the Mixed Certification and Enforcement Approach. This approach will yield a superior data base required to monitor the compliance behavior of manufacturers. Test costs will be spread more evenly over all of the basic models being distributed. The potential for adversely affecting new product introduction and placing smaller manufacturers at a disadvantage through delays in distribution and production will be reduced. The anticipated level of compliance (and consumer confidence) will be higher. The proposed approach is discussed in detail in sections 6.4 and 6.5.

6.2 Statistical Analysis

6.2.1 *Evaluation of Sampling Plans.* Test procedures have been promulgated, among other things, for determining if consumer products sold on the market are actually in compliance with the applicable standards. The test procedures could be conducted on each consumer product produced, or a sample of the total population could be selected for testing. There are several sampling plan options which could be used by DOE in the certification and enforcement efforts. Eighteen different sampling plan options were analyzed to determine if they met the following criteria:

a. Minimize manufacturers' testing costs;

b. Limit the calendar time required for testing;

c. Assure compatibility with the sampling plan promulgated for the FTC labeling program;

d. Provide a high statistically valid probability that a manufacturer preliminarily found to be in noncompliance will actually be in noncompliance; and

e. Provide a high statistically valid probability that basic models that are tested meet applicable energy efficiency standards. A summary evaluation of the eighteen options appears in Table 6–1. A more detailed discussion is contained in Appendix G of the "Certification and Enforcement Analysis," TSD No. 3.

Table 6–1.—*Evaluation of Sampling Plan Options*

Sampling plan options	Cost of testing		Calendar time required for testing	Consistency with FTC rule
	Expected total	Distribution among manufacturers		
Option #1—All units tested divided by 0 pct defective standard.	Infeasible	Proportional to production volume	Infeasible	No.
Option #2—Fixed sample divided by 0 pct defective standard.	Highest	Equal	Shortest (d)	Option more precise (a, b).
Option #3—Integer sequential sampling with unlimited iterations divided by 0 pct defective standard.	Low	Unequal but favors efficient models.	Longest and unlimited	Option more precise (a, b).
Option #4—Integer sequential sampling; limited iterations divided by 0 pct defective standard.	Lowest	Unequal but favors efficient models.	Multiple of unit test time	Option more precise (a, b).
Option #5—Batch sequential sampling with unlimited iterations divided by 0 pct defective standard.	Moderate (c) but unlimited	Unequal but favors efficient models.	Moderate (c) but unlimited	Option more precise (a, b).
Option #6—Batch sequential sampling with limited iterations divided by 0 pct defective standard.	Moderate (c)	Unequal but favors efficient models.	Moderate (c)	Option more precise (a, b).

Table 6-1.—*Evaluation of Sampling Plan Options*—Continued

Sampling plan options	Cost of testing		Calendar time required for testing	Consistency with FTC rule
	Expected total	Distribution among manufacturers		
Option #7—All units tested divided by greater than 0 pct defective standard.	Infeasible	Proportional to production volume	Infeasible	No.
Option #8*—Fixed sample divided by greater than 0 pct defective standard.	Highest	Equal	Shortest (d)	Option more precise (a, b).
Option #9—Integer sequential sample with unlimited iterations divided by greater than 0 pct defective standard.	Low	Unequal but favors efficient models	Longest and unlimited	Option more precise (a, b).
Option #10—Integer sequential sampling with limited iterations divided by greater than 0 pct defective standard.	Lowest	Unequal but favors efficient models	Multiple of unit test time	Option more precise (a, b).
Option #11—Batch sequential sampling with unlimited iterations divided by greater than 0 pct defective standard.	Moderate (c) but unlimited	Unequal but favors efficient models	Usual	Option more precise (a, b).
Option #12*—Batch sequential sampling with limited iterations divided by greater than 0 pct defective standard.	Moderate (c)	Unequal	Moderate (c)	Option more precise (a, b).
Option #13—All units tested divided by mean energy efficiency standard.	Infeasible	Proportional to production volume	Infeasible	No.
Option #14*—Fixed sample divided by mean energy efficiency standard.	Highest	Equal	Shortest (d)	Option more precise (b).
Option #15—Integer sequential sampling with unlimited iterations divided by mean energy efficiency standard.	Low	Unequal but favors efficient models	Longest and unlimited	Option more precise (b).
Option #16—Integer sequential sampling with limited iterations divided by mean energy efficiency standardd.	Lowest	Unequal but favors efficient models	Multiple of unit test time	Option more precise (b).
Option #17—Batch sequential sampling with unlimited iterations divided by mean energy efficiency standard.	Moderate (c) but unlimited	Unequal but favors efficient models	Moderate (c) but unlimited	Option more precise (b).
Option #18*—Batch sequential sampling with limited iterations divided by mean energy efficiency standard.	Moderate (c)	Unequal but favors efficient models	Moderate (c)	Option more precise (b).

a. After transformation of EEL's to defective indicators.
b. For certain confidence limits and tolerances.
c. Depends on batch size, as well as other parameters.
d. Same as unit test time.
*Preferred options.

6.2.2 *Types of Standards.* The sampling plan options are designed for compatibility with four types of standards: (1) the mean efficiency standard, (2) the percent defective standard, (3) the combination of an energy efficiency mean and standard deviation, and (4) the combination of an energy efficiency mean and percent defective standard.

A "mean efficiency standard" seeks to maximize the average efficiency of a basic model. Such a standard establishes the minimum allowable level of average energy efficiency for a given basic model.

An "energy efficiency standard" may be established so that a basic model is allowed to have a specified percentage of sampled units which does not meet the standard. Defective units, in the case of energy efficiency standards, are defined as units with energy efficiencies below the established standard. The percentage of defective units is computed by dividing the number of defective units by the number of units tested and multiplying by 100. A "percent defective" approach requires that a specified percentage of units produced achieve energy efficiencies greater than the efficiency standard. That is, only a given proportion of units are allowed to have energy efficiencies below the efficiency standard.

To account for production variation, whereby some units may be well below or well above the standard efficiency level, a rule might also include a "standard deviation" statistic to measure the variability of energy efficiencies among units. A "combination mean and standard deviation" approach combines the mean and standard deviation measures into a single index, and the basic model index would have to exceed the standard.

Alternatively, production variation might be accounted for by combining the mean approach and the percent defective approach, so that basic models must have average energy efficiencies which meet or exceed the standard average efficiency and include less than a given production of units with efficiencies below the given percent defective allowed.

Although each approach has some advantages, the mean approach was judged superior, insofar as it controls the overall energy efficiency level for a given basic model and requires less testing than the alternate approaches. The mean approach is consistent with the energy conservation goal and the certification and enforcement testing objective. The mean approach has the further advantage of being consistent with the approach selected for the FTC energy efficiency labeling program requirements, thus reducing the testing burden of the two programs.

6.2.3 *Types of Sampling Plans.* The proposed rule includes a sequential sampling plan for determining compliance with energy efficiency standards. Various systems that could be used for selecting the number of units to be tested and the number of test sequences for determining compliance were analyzed. Three alternative systems that were studied are:

a. Test the total population of covered consumer products (which would entail 100% sampling);

b. Test a predetermined fixed number of production units; this is called a "single sampling plan;"

c. Test units within a basic model, one at a time or in groups, until a determination can be made that a basic model is in compliance or noncompliance; this is called a "sequential sampling plan."

The only way to determine conclusively (with 100% certainty) that a basic model of a covered product is in compliance with an applicable energy efficiency standard is to test every unit in the basic model. The cost and time constraints associated with this alternative make it infeasible. Although testing the total population is the only way to be 100% certain of compliance available statistical sampling methods

can be used to generate highly accurate information.

A second alternative considered was the use of a single sampling plan. In order to use the single sampling plan, sufficient numbers of units must be tested to yield results with high levels of certainty, e.g., 97.5%.

The determination of the number of units to be tested is based in part on expected unit-to-unit variability. Reliable estimates of unit to unit variability are unavailable and significant differences may exist among basic models and manufacturers. Thus, a single sample size giving sufficiently high assurance of compliance cannot be established without incurring unacceptably high testing costs for some manufacturers.

The third alternative that was considered was sequential sampling. In sequential sampling, the size of the total sample is not determined in advance. Instead, after each unit or group of units is tested, a decision is made to (1) accept, (2) reject, or (3) suspend judgment and continue sampling until a decision is ultimately reached. Sequential sampling methods often permit reaching a decision on the basis of fewer tests than single sampling plans. There are two basic types of sequential sampling schemes:

a. Integer sequential sampling, and

b. Batch sequential sampling.

Integer sequential sampling consists of making the accept, reject, or continue testing decision at the completion of each individual test. The integer sequential sampling process may be designed so that there is no maximum number of units tested to make the accept or reject decision for each basic model. This would be referred to as an unlimited iteration plan since no termination point is set on the maximum test size. Integer sequential sampling may also be conducted with limited iterations. In this plan, a given maximum sample size is designated as a termination point in the sampling process, e.g., a maximum number of units that may have to be tested is established before making an accept or reject decision.

The other basic type of sequential sampling plan is batch sequential sampling, where a group of units is tested before each accept, reject, or continue testing decision. The unlimited versus limited iteration distinction also applies to batch sequential sampling. With limited iterations, a maximum number of test samples is established prior to the initiation of testing. When this maximum is reached, the testing is curtailed and an accept or reject decision is made on the basis of information obtained in the testing process.

A particular variation of the batch sequential system with limited iterations is the double sampling plan. In this type of plan, a relatively small first test sample is selected and tested. If the test results show that the basic model clearly exceeds the standard, then the model is considered in compliance. If the results demonstrate that the model is clearly below the standard then the model is determined in non-compliance. If the results, however, are close to the standard, a second sample is selected, the test results are combined with the results of the first test sample, and the model is then determined to be in compliance or noncompliance.

The proposed rule incorporates a double sampling plan as a compromise between single and integer sequential sampling plans. The major disadvantage of the integer sequential sampling plan is the test time involved in making decisions under this system. Units of basic models would be required to be tested one at a time in sequence until a decision could be made. Under the batch sequential approach (double sampling), the units selected for the first batch can be tested simultaneously rather than sequentially. If a second batch is necessary, these units can also be tested simultaneously. Therefore, total test time for the batch sequential approach can be minimized. If the integer sequential approach were utilized, then total test time for completing the sampling plan would be equal to the number of units required to be tested multiplied by the time required for conducting the test procedure. In most cases the number of units tested would be about the same under both the integer and batch sequential sampling plans. The anticipated number of test units is four or five for most basic models. If, for example, five units were required to be tested under an integer sequential sample approach, then test time could be 150% greater than the batch sequential approach. If more than five units are required, then this percentage could increase. Test costs in both of these approaches were considered to be equal; therefore the batch sequential plan (double sampling plan) was considered to be superior to all alternatives considered.

6.3 Discussion of Proposed Double Sampling Plan

6.3.1 General Sampling Considerations

Sampling a few units from a population of units inherently involves the risk that the characteristics observed for the sample are not typical of the total population. Some risk is justified by the substantial cost reduction obtained by testing a sample rather than all units produced. This sampling plan, like all sampling plans, has been developed with the factors of sampling risk and cost in mind.

In other previous research and industrial sampling situations, various sampling designs have been combined to balance risk and cost. Based on these situations, the consumer product energy efficiency standards' sampling plan was formed by melding two well accepted methodologies: double sampling and mean efficiency standard. The sampling procedures are statistically valid and adhere strictly to theoretical sampling principles with two constraints required for effective enforcement by DOE. This section discusses initially the sampling plan in general, and second, addresses features required by extreme and unusual basic model characteristics.

The average energy efficiency of all units of a basic model is referred to as the "true mean," and, generally, it is the intent of the sampling procedure to determine whether the true mean of a basic model meets or exceeds the DOE energy efficiency standard. Emphasis is placed on the concept that the tests are conducted to make an inference about the true mean energy efficiency of the model. Should the energy efficiency values of test units indicate with sufficient assurance that the true mean is below the energy efficiency standard, then the model is not in compliance. Thus, the sample test results are the sole source of information used to determine compliance or noncompliance.

DOE recognizes that units of a basic model vary in energy efficiency for a number of valid reasons, including differences in component parts, production, and testing. The distribution with which energy efficiency values could occur for a basic model is illustrated in Figure 6–1. The Figure illustrates normal unit-to-unit variability. In the sampling plan, unit-to-unit variability is measured by the standard deviation or the coefficient of variation. Both the standard deviation and coefficient of variation are standard measures of variability commonly defined in statistics textbooks.

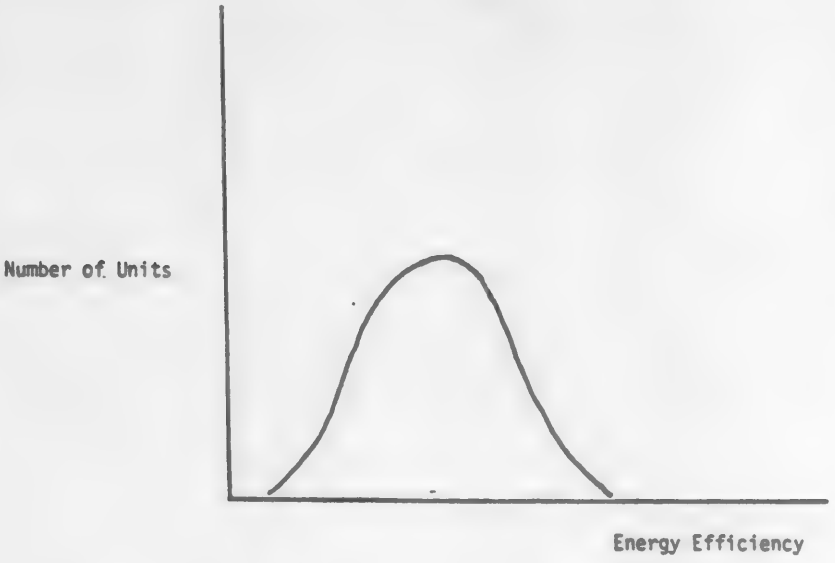

Figure 6-1 Illustration of Distribution of Energy Efficiency Values for Units of a Basic Model

The variability of unit energy efficiencies implies that if the certification decision for an entire basic model is based upon the test results of a single unit, substantial risk is entailed. A single test unit drawn randomly from the population of units of a basic model may by chance have a very high or very low energy efficiency. The public would suffer if, by mere chance, a highly efficient unit were drawn from a model whose true mean energy efficiency is below the standard, and the manufacturer would suffer if a very low energy efficiency unit were drawn from a basic model with a true mean above the DOE standard. The public's and manufacturer's risks are reduced through the application of a statistically meaningful sampling plan and basing the certification decision on the mean energy efficiency of the sample units.

The relationship between the variability of the energy efficiency of individual units and the variability of sample means is treated in the central limit theorem. In the case of energy efficiency testing, the central limit theorem means that the sample mean energy efficiency variability is equal approximately to the standard deviation divided by the square root of the sample size, the approximation becoming increasingly good as sample size increases. A sample size of four units has been shown to be large enough to meet the assumptions of the central limit theorem. Consequently, the minimum sample size appropriate for testing a basic model is four, and certification decisions are made only with sample sizes of four or more. An important application of the central limit theorem is the ability to control the standard error by specifying the sample size. For example, if the standard deviation (variability of the unit energy efficiencies) is 10 and the sample size is 4, then the standard deviation of the sample means (called the "standard error") is equal to 10 divided by the square root of 4 ($10/\sqrt{4}$), or 5. The equation for the standard error is presented as equation 3 in Appendix A of the Certification and Enforcement subpart of the rule. The standard error declines as the sample size increases and, in general, the standard error for a given distribution of unit energy efficiencies is controlled by the size of the sample chosen.

Consequently, the rule contains a well-defined procedure for determining the sample size. By requiring a specified number of units for testing, the sample means of units can be expected to fall within a reasonable range about the standard or, for very efficiently designed units, well above the standard. Such ranges are referred to as "tolerance limits."

In developing the tolerance limits and sample sizes, consideration has been given to the manufacturer's and the public's risks. The manufacturer's risk is the possibility that a model with a true mean equal to the standard is found in noncompliance because the sample mean of the test units is unreasonably low. In statistical hypothesis testing, the risk of falsely rejecting a true hypothesis is generally kept within a range of 1 to 10 percent. The FTC sampling plan usually sets this level at 2.5 percent. DOE's judgment is that a 2.5 percent level of manufacturer's risk is reasonable in terms of sample size and associated test costs. Further, a manufacturer can reduce his risk by designing basic models above the energy efficiency standard. The sampling plan controls the producer's risk at 2.5 percent. This tolerance limit has also been chosen to limit the public's risk of inefficient models being determined in compliance. The DOE tolerance limit for determining sample size is therefore 5 percent of the standard, including a manufacturer's risk of no greater than 2.5 percent that a complaint basic model would be rejected (with the exception of models with extremely high coefficients of variation, discussed in section 6.3.2).

In summary, the primary design for the sampling plan is drawn from statistical sampling principles that are statistically valid and widely applied and discussed in most statistical textbooks. Selected references are listed in Appendix G of TSD #3.

6.3.2 Special Sampling Considerations

In statistical sampling theory and in the procedures set forth in the proposed rule, the size of the sample depends upon the variability of energy efficiency of individual units, the tolerance specified by DOE for the accuracy of the results, and the risk level borne by manufacturers and the public.

The following additional considerations were important in developing the sampling plan:

a. Generally, available information is inadequate for determining the standard deviation of a model;

b. Sample size should be minimized for models with superior mean energy efficiency and low unit-to-unit variability.

Until some testing has been conducted, estimates of variability are unavailable. Consequently, a sampling plan which begins without an estimate of variability is required. Also, DOE desires to reduce the test burden through the selection of a sampling plan if the public's risk is not increased by the adoption of such a plan. A sampling procedure recommended in such situations is the double sampling plan.

Double sampling is a sequential process in which additional testing is contingent upon previous test results. (The procedure is illustrated in Figure 6–2.) In a double sampling plan, a small sample is drawn initially and the units are tested. As discussed above, DOE has determined that the minimum first sample size is four. Following the first test, one of three decisions is reached.

First, a sample mean significantly below the standard implies that the model is in noncompliance. Therefore, testing is curtailed and the model is not certified. The probability of this case occurring erroneously is the "producer's risk" shown in Table 6–2. Second, a sample mean significantly above the standard or a sample mean within the DOE tolerance limits where the variability of the initial sample units are sufficiently small implies that the model is in compliance. Therefore, testing is curtailed and the model is certified. Models which can be tested with small samples are often found in compliance with minimal sample sizes. The probability of this case occurring is shown in Table 6–3, as "Probability of Compliance after First Sample." Third, a sample mean the results of which do not clearly indicate whether the model is complying or not, are used to determine the second sample size. The variability of the units within the first sample, the tolerance limit and the risk level provide the information necessary for determining a second sample size.

Based on the second sample, one of two decisions may be made. First, a sample means of all units tested, which falls significantly below the energy efficiency standard, implies that the basic model has a mean energy efficiency level which fails to comply with the standard. Therefore, the unit is not certified. The risk of not being certified increases rapidly as the true mean energy efficiency of the model declines. Probabilities of non-certification of noncomplying models are reported in Table 6–4. Second, a sample mean which is above the standard or not significantly below the standard (but above the tolerance limit) is accepted as being in compliance.

All testing is stopped following the second sample.

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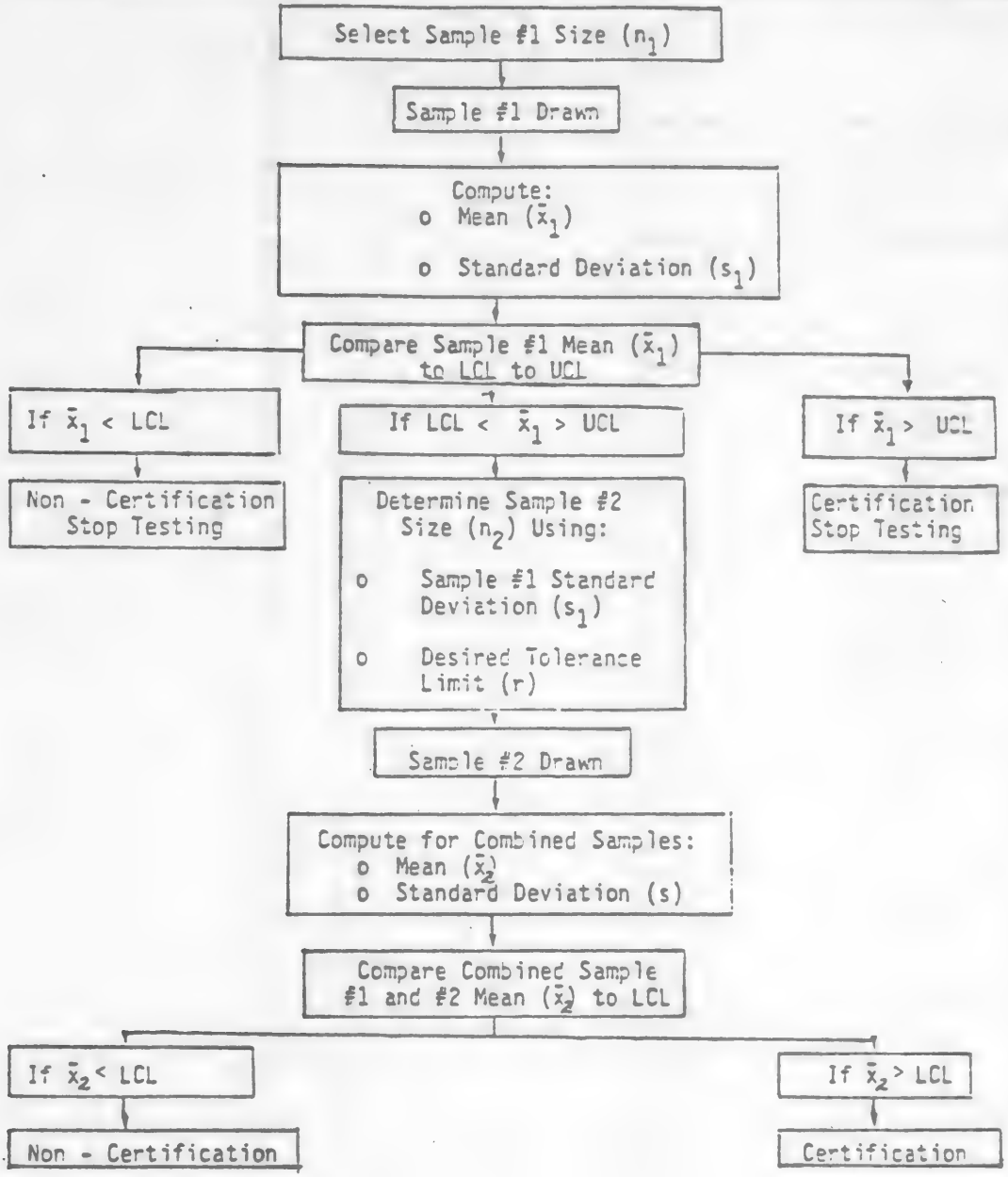
Select Sample #1 Size (n_1)
Sample #1 Drawn
Compute:
o Mean ($\bar{x}_1$)
o Standard Deviation (s_1)
Compare Sample #1 Mean ($\bar{x}_1$) to LCL to UCL
If $\bar{x}_1$ < LCL
If LCL < $\bar{x}_1$ > UCL
If $\bar{x}_1$ > UCL
Non - Certification Stop Testing
Determine Sample #2 Size (n_2) Using:
o Sample #1 Standard Deviation (s_1)
o Desired Tolerance Limit (r)
Certification Stop Testing
Sample #2 Drawn
Compute for Combined Samples:
o Mean ($\bar{x}_2$)
o Standard Deviation (s)
Compare Combined Sample #1 and #2 Mean ($\bar{x}_2$) to LCL
If $\bar{x}_2$ < LCL
If $\bar{x}_2$ > LCL
Non - Certification
Certification

DOUBLE SAMPLING PLAN
(LIMITED BATCH SEQUENTIAL)

FIGURE 6-2

TABLE 1

OPERATING CHARACTERISTICS OF THE PROPOSED SAMPLING PLAN

True Mean Relative to DOE Standard	Coefficient of Variation (CV) and Required Sample Size (n)							
	CV=.02, n=4		CV=.04, n=5		CV=.06, n=8		CV=0.10, n=18	
	Producer	Consumer	Producer	Consumer	Producer	Consumer	Producer	Consumer
-10%	—	0.3%	—	2.5%	—	2.5%	—	2.4%
-7.5%	—	1.2%	—	11.7%	—	13.9%	—	15.2%
-5.0%	—	8.5%	—	50%	—	50%	—	50%
-2.5%	—	73.3%	—	88.3%	—	86.1%	—	84.8%
Same	2.5%	—	2.5%	—	2.5%	—	2.4%	—
2.5%	0.5%	—	0.7%	—	0.5%	—	0.3%	—
5.0%	0.2%	—	0.3%	—	0.1%	—	0%	—
7.5%	0.1%	—	0.1%	—	0	—	0%	—
10.0%	0	—	0.1%	—	0	—	0%	—

Note: Consumer risk in the probability P(t) that a true mean (μ) relative to the DOE standard ($\bar{x}^*$) of less than 1.0 will generate a sample mean ($\bar{x}$) greater than a given lower confidence limit (LCL):

$$t = \frac{(\mu/\bar{x}^*) - LCL}{CV/\sqrt{n}} \quad ; \quad P(T \leq t)$$

Producer risk is the probability that a true mean relative to the DOE standard greater than 1.0 will generate a sample mean lower than a given lower confidence limit.

$$1 - P(T \leq t)$$

TABLE 2

PROBABILITY OF CERTIFICATION AFTER FIRST SAMPLE
of FOUR UNITS FOR VARIOUS DESIGN LEVELS AND
COEFFICIENTS OF VARIATION

True Mean Relative to DOE Standard	Coefficient of Variation	Probability of Compliance After First Sample
1.000	.02	0.975
1.025	.02	0.995
1.050	.02	0.998
1.075	.02	0.999
1.100	.02	1.000
1.000	.04	0.025
1.025	.04	0.073
1.050	.04	0.267
1.075	.04	0.690
1.100	.04	0.915
1.000	.06	0.025
1.025	.06	0.051
1.050	.06	0.115
1.075	.06	0.276
1.100	.06	0.561
1.000	.10	0.025
1.025	.10	0.038
1.050	.10	0.059
1.075	.10	0.096
1.100	.10	0.162

TABLE 3

RISK OF NON-CERTIFICATION
INCURRED BY MANUFACTURERS WITH BASIC
MODEL TRUE MEANS BELOW DOE STANDARD

True Mean Relative To DOE Standard	Coefficient of Variation (CV) and Required Sample Size (n)			
	CV = .02, n=4	CV = .04, n=5	CV = .06, n = 8	CV = 0.1, n=18
-10%	99.7%	97.5%	97.5%	97.6%
-7.5%	98.8%	88.3%	86.1%	84.8%
-5.0%	91.5%	50%	50%	50%
-2.5%	26.7%	11.7%	13.9%	15.2%

Note: These calculations based on the producer's risk equation:

$$t = \frac{(\mu/\bar{x}^*) - LCL}{CV \div \sqrt{n}} \quad ; \quad 1 - P(T \leq t)$$

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The double sampling plan follows the procedures set forth in standard works on the subject (H.F. Dodge and H.G. Roming, *Sampling Inspection Tables: Single and Double Sampling, Second Edition,* John Wiley & Sons, Inc., New York, 1959; and G. B. Wetherill, *Sequential Methods in Statistics,* John Wiley & Sons, Inc., New York, 1966), except for two features:

a. The minimum sample mean acceptable for compliance is 0.900 times the efficiency level of the applicable energy efficiency standard; and

b. The maximum sample size to be selected for enforcement testing is 20 units.

These constraints are required to assure attainment of objectives and to provide for establishment of a viable enforcement program. Both features are designed to reduce consumer risk (risk of inefficient models receiving compliance) for models with extreme variability (coefficients of variation greater than 0.1). When a model has an extreme variability, the estimate of the required second sample size is more prone to error than in the case of models with smaller variability. Also, models with extreme variability are likely to require substantial testing cost and time to demonstrate compliance or noncompliance. Consequently, DOE is seeking to limit the maximum number of units to be tested for enforcement purposes to assure timely and effective enforcement action. It should be noted that these restrictions apply only to models with extremely large coefficients of variation.

Information supplied DOE by industry sources which has not been substantiated indicates that only in a few cases is a coefficient of variation of .05 ever exceeded.

DOE solicits any additional data or comments on coefficient of variation related to energy efficiency standards and potential test sample sizes of the proposed double sampling plan.

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6.3.3 EXAMPLES OF DOUBLE SAMPLING

The first example presents a situation in which compliance is found for a basic model after the first sample is drawn and tested. According to the certification rule, four production test units of room air conditioners are selected in accordance with the specified random selection procedures of this proposed rule. The DOE energy efficiency standard is assumed to be 8.4. The test results of the four units are as follows:

a. 8.5
b. 8.4
c. 8.5
d. 8.2

The first sample mean ($\bar{x}_1$) and standard deviation (s_1) using the units in the first sample (n_1) are computed. The sample mean is computed according to step 2 of Appendix A of this subpart, as follows:

$$\bar{x}_1 = \frac{1}{n_1}\left(\sum_{i=1}^{n_1} EE_i\right)$$

where

$\bar{x}_1$ is the sample mean

n_1 is the number of units in the first sample.

EE_i is the measured energy efficiency of unit i.

Therefore, $\bar{x}_1 = \frac{8.5 + 8.4 + 8.5 + 8.2}{4}$

$\bar{x}_1 = 8.4$

The standard deviation (s_1) of the measured efficiency level for the first sample is calculated according to step 3 with the following formula:

$$s_1 = \sqrt{\frac{\sum_{i=1}^{n_1} (EE_i - \bar{x}_1)^2}{n_1 - 1}}$$

$s_1 = .141$

The standard error of the sample mean ($s_{\bar{x}}$) is estimated according to step 4 as follows:

$$s_{\bar{x}_1} = \frac{s_1}{\sqrt{n_1}} = \frac{.141}{\sqrt{4}} = .071$$

With the estimated standard error of the sample mean, the upper and lower confidence limits are calculated according to step 5 as:

$$LCL = EEL - t\, s_{\bar{x}_1}$$

$$UCL = EEL + t\, s_{\bar{x}_1}$$

where EEL is the applicable energy efficiency standard and a statistic based on confidence level (95%) and sample size. (t-statistics values are given in Table A-5 of Appendix A to the rule.)

Using an 8.4 energy efficiency rating as EEL,

$LCL = 8.4 - 3.182\ (.071) = 8.2$, and

$UCL = 8.4 + 3.182\ (.071) = 8.6$.

According to step 6, the sample mean ($\bar{x}_1$) of 8.4 is compared to the upper and lower confidence limits. The sample mean falls between the upper confidence limit (8.6) and the lower confidence limit (8.2), and therefore, a second sample size must be determined. It is necessary to continue with step 7. The example will continue using the alternate procedure of Appendix A..

The coefficient of variation is calculated by dividing the standard deviation (s_1) by the sample mean ($\bar{x}_1$).

$$CV = \frac{s_1}{\bar{x}_1} = \frac{.141}{8.4} = 0.017$$

From Table A-4, the required minimum sample size of 4 units is determined. In the first sample, 4 units were tested, and consequently no further sampling is required. The sample mean is greater than the lower confidence limit. Therefore, the model is found to be in compliance.

A second example is presented to illustrate a basic model which is certified after the second sample. Following step 1 of Appendix A of this subpart, four production test units of room air conditioners are selected in accordance with the specified random sample selection procedures of this proposed rule. The energy efficiency (EE) test results of the four units are as follows:

a. 7.7
b. 7.9
c. 8.5
d. 8.7

The first sample mean ($\bar{x}_1$) and standard deviation (s_1) using the units in the first sample (n_1) are then computed. The sample mean is computed according to step 2 as follows:

$$\bar{x}_1 = \frac{1}{n_1} \left(\sum_{i=1}^{n_1} EE_i \right)$$

where

$\bar{x}_1$ is the sample mean.

n_1 is the number of units in the first sample.

EE_i is the measured energy efficiency of unit i.

Therefore, $\bar{x}_1 = \frac{7.7 + 7.9 + 8.5 + 8.7}{4}$

$\bar{x}_1 = 8.2$

The standard deviation (s_1) of the measured efficiency level for the first sample is calculated according to step3 with the following formula:

$$s_1 = \sqrt{\frac{\sum_{i=1}^{n_1} (EE_i - \bar{x}_1)^2}{n_1 - 1}}$$

$s_1 = .476$.

The standard error of the sample mean ($s_{\bar{x}}$) is estimated according to step 4 as follows:

$$s_{\bar{x}_1} = \frac{s_1}{\sqrt{n_1}} = \frac{.476}{\sqrt{4}} = 0.238$$

With the estimated standard error of the sample mean, the upper and lower confidence limits are calculated according to step 5 as:

$LCL = EEL - t\, s_{\bar{x}_1}$

$UCL = EEL + t\, s_{\bar{x}_1}$

where EEL is the DOE energy efficiency standard and t is a statistic based on confidence level (95%) and sample size. (t-statistics values are given in Table A-5 of appendix A to the rule.)

Using an 8.4 energy efficiency rating as EEL,

LCL = 8.4 - 3.182 (.238) = 7.6

UCL = 8.4 + 3.182 (.238) = 9.2

According to step 6, the sample mean ($\bar{x}_1$) of 8.2 is compared to the upper and lower confidence limits. In this example, the sample mean is between the confidence limits, and the initial sample is insufficiently large to provide lower and upper confidence limits that lie within a tolerance limit of plus or minus 5 percent of the applicable standard. Therefore, further testing is required.

Continuing with this example, it is necessary to proceed to step 7 of Appendix A. The example will continue using the alternate procedure of Appendix A. Table A-4 is used to calculate the sample size for n_2. The coefficient of variation is calculated by dividing the standard deviation (s_1) by the sample mean ($\bar{x}_1$).

$$cv = \frac{s_1}{\bar{x}_1} = \frac{.476}{8.2} = 0.058$$

By entering Table A-4 with a coefficient of variation equal to .058, n_2 is found to be equal to 8 minus n_1, or, using the example, n_2 is equal to 4 units required to be tested. The additional test units are selected and tested. For example, the results of the additional testing are as follows:

a. 7.7

b. 8.0

c. 8.4

d. 8.7

Under steps 8 and 9 it is necessary to compute the sample mean ($\bar{x}_2$) and standard deviation (s_2) using the units tested in both the first and second samples. Using the formulas given under steps 8 and 9 the calculations are

$$\bar{x}_2 = \frac{1}{n_1 + n_2}\left(\sum_{i=1}^{n_1+n_2} EE_i\right)$$

$$= \frac{7.7 + 7.9 + 8.5 + 8.7 + 7.7 + 8.0 + 8.4 + 8.7}{8} = 8.2$$

and

$$s_2 = \sqrt{\frac{\sum_{i=1}^{n_1+n_2} (EE_i - \bar{x}_2)^2}{n_1 + n_2 - 1}} = 0.424$$

Under step 11 compute the lower confidence limit for the sample mean with a confidence level of 97.5 percent (one-tailed test). This can be done by using Table A-3 and a calculation of the new coefficient of variation.

$$cv = \frac{s_2}{\bar{x}_2} = .052$$

With the new cv of .052 and a total test sample size of 8 entering table A-3, the value is .958. This is multiplied by the DOE standard to determine the new LCL.

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LCL = .958 × 8.4 = 8.047

According to step 12 if the sample mean ($\times_s$) were less than the lower confidence limit, the basic model would be determined to be in noncompliance. If the sample mean is greater than the LCL, the basic model is determined to be in compliance. In this example, the sample mean ($\times_s$) is greater than the LCL and the model is in compliance.

8.22 EE > 8.047 EE

Only in a very few cases, for basic models with high unit-to-unit variability, might the lower confidence limit, after a second test sample, be lower than 90 percent of the applicable energy efficiency level. In such cases, DOE requires that the calculated lower confidence limit be replaced by a value equal to 90 percent of the applicable standard prior to making a compliance/noncompliance determination. This minimum applies to all certification and enforcement efficiency testing conducted under the proposed rule.

6.3.4 Random Selection of Test Units. The following is the basic process for selecting individual production units for required certification or enforcement testing:

A batch is defined as the collection of production units of a basic model from which individual test units may eventually be selected. It shall include all production units produced during a two-day or longer period, or produced during a specific production run if it is shorter than two days. A batch is normally defined in terms of production over a specified period of time. For the purposes of certification testing, the manufacturer may define the batch over an extended period of time, so as to include different production runs, manufacturing facilities, or other variables. For the purposes of a DOE enforcement test audit, a batch may be defined to include all production units on a manufacturer's premises at a specific period of time.

Individual test units are selected from the batch in the following manner: First, a batch sample is randomly selected from the batch. Second, individual test units are randomly selected from the batch sample. To assure that an adequate number of units are available to complete the testing without retaining the entire batch, a batch sample of no fewer than 20 units is selected and retained. Assuming that the batch sample size is sufficient to assure completion of the testing, there is no need to retain the remainder of the batch.

Each selection, whether of units for the batch sample or of individual test units, shall be made by the following random process:

(a) All units in the batch or batch sample, from which the selection is to be made, are sequentially numbered.

(b) A random numbers table is used to determine the numbers of the units in the collection to be selected.

The purpose of the random sample selection is to eliminate potential bias in the test sample results caused by intentional or unintentional systematic selection of units with above or below average energy efficiencies. With a random selection, each unit is just as likely to be selected as any other unit in a given collection, i.e., batch or batch sample.

Recognizing that there may be alternative methods of selecting units at random, DOE solicits comments on the random selection process proposed.

There will be occasions when DOE under an enforcement test audit may have reason to suspect that units of a basic model being manufactured at a specific facility or using components from a specific supplier are more likely to be in noncompliance than other units of the same basic model. There may be situations where a manufacturer has changed component suppliers or is assembling some of the units with different configurations than other units within the basic model. To have an effective enforcement approach it is necessary for DOE to assure that all configurations of the basic model meet the applicable energy efficiency standards. Under these circumstances, a DOE inspector may subdivide the batch utilizing specific criteria (i.e., date of manufacture, component supplier, location of manufacturing facility or other criteria which may differentiate one unit from another within a basic model). The batch sample will then be randomly selected from one or more subdivided groups within the batch.

6.3.5 Skewness. Skewness which is defined as a nonsymmetrical frequency distribution around the mean, is a potential problem. In the case of skewed distributions, the frequencies of energy efficiency factors for a basic model are different from a normal distributed frequency. Although this condition is assumed to be nonexistent, there is the possibility that it actually does exist. Therefore, the existence of skewness and its effects may bias the statistical tests. The assumption of a symmetrical distribution becomes increasingly valid as the sample size increases. Tests conducted on samples of various sizes lead to the conclusion that if at least 4 units are tested, skewness is not unusually extreme. Thus, by using a mean standard and sample sizes of at least 4 units, the effect of skewness is expected to be slight.

See TSD No. 3, Certification and Enforcement Analysis for further discussion.

6.4 Certification

Basic compliance with the energy efficiency standards under the proposed rule will be insured by the manufacturers of the covered products. The method by which they will achieve this is by testing of basic models before their distribution by the sampling methods discussed earlier and by the test procedures prescribed by DOE regulations. The results of such tests and the data on which they are based will be submitted to DOE as a statement of compliance and will constitute the basis on which the manufacturer's certification of compliance rests. These requirements apply to current models which are in production on the effective date of the final rule, and to any new models produced after that date.

6.4.1 Pre-Certification Report

A pre-certification report for all covered products manufactured shall be submitted by certified mail within 60 calendar days after the promulgation date of this rule and shall include:

(1) A list of the covered products manufactured or sold;

(2) A list of the models of each covered product manufactured, grouped according to basic model;

(3) Starting serial numbers or other numbers identifying the date of manufacture of covered products; and

(4) A scheduled of anticipated certification testing.

A pre-certification report will be required to be submitted by certified mail for all new models subsequently manufactured at least 60 days prior to planned certification testing. All requirements of the pre-certification report are given in Appendix C to the rule.

6.4.2 Certification Report

A certification report, based on the testing of production units, will be required for each covered basic model prior to distribution in commerce. Although the product certification report is not an annual requirement for each covered basic model, DOE anticipates that recertification testing and reporting of up to 10 percent of all carry-over basic models each year may be requested. Considerations that may affect the Secretary's decision to require recertification include: a change in the standard for the basic model in question; performance of the basic model based on certification and

enforcement test data; and, the number and type of design or other changes incorporated into the basic model that may affect energy usage, i.e., changes in production processes or facilities, in quality control practices, in component suppliers.

Each certification report will include a "statement of compliance" executed in accordance with the requirements of the proposed rule. The "statement of compliance" includes a declaration by the manufacturer that all batches of the basic model including all models and all configurations within the basic model are represented by the units reported in the certification report for that basic model and comply with the applicable energy efficiency standards. The certification report will include: test data necessary for determination of product compliance, a description of the basic model, a list of manufacturer model numbers represented by the basic model being certified and information on anticipated production and certification test schedules of the model. Copies (using standard size paper) of all pertinent test data must be retained on file by the manufacturer for possible DOE review.

A manufacturer's certification of compliance of a basic model must be based on the testing of production units in accordance with the sampling plan set forth in Appendix A of the proposed rule.

6.4.3 Conditional Certification

DOE has mitigated possible adverse effects of the above production unit testing requirement on the introduction of new products. The proposed rule provides for a manufacturer to submit a certification report, allowing distribution in commerce for a prescribed limited period of time, based on the testing of one of more nonproduction units. A conditional certification report that includes a compliance statement based on nonproduction unit testing must be submitted by certified mail at least 60 days prior to distribution in commerce of the basic model and must include a schedule for anticipated certification testing of production units. The nonproduction unit testing must conform with the following requirements:

1. Units tested shall be representative of production units with respect to all energy efficiency and consumer discernible characteristics;

2. One valid test shall be conducted for each unit in accordance with applicable DOE test procedures;

3. If a manufacturer has tested prototype units to satisfy test requirements of the Federal Trade Commission Labeling Rule, and production of the first batch of that basic model has not begun, then the results of all such tests shall be included in the "conditional" certification test data;

4. Each unit tested shall have an energy efficiency that is no less than the applicable energy efficiency standard for the subject basic model to be determined to be in compliance; and,

5. If any unit tested has a measured energy efficiency that is less than the applicable energy efficiency standard, the basic model is determined to be in noncompliance.

Continued distribution of a "conditionally certified" basic model is contingent on the required production unit testing being conducted on test units drawn randomly from the first available production of the basic model. A new statement of compliance and test results meeting the sampling requirements shall be submitted in a certification report by certified mail within a specified number of a calendar days from the start of production for that model, as follows:

(1) Furnace and boilers: 20 days.
(2) Water heaters: 20 days.
(3) Refrigerator/freezers: 55 days.
(4) Kitchen ranges and ovens: 20 days.
(5) Central air conditioners: 40 days.
(6) Clothes dryers: 20 days.
(7) Room air conditioners: 20 days.
(8) Freezers: 55 days.

The above schedule for submitting the supplemental product certification report reflects the differences in the time required to test different products. The allotted number of days is based upon the estimated time required to sequentially test four units of each product. The time allotted to "refrigerators/refrigerator-freezers" and "freezers" is based upon a proposed amendment to the test procedures for these product categories that requires the use of no more than two test points. DOE may grant an extension of time to complete testing, upon a written request from the manufacturer, if supported by evidence that additional time is necessary (e.g., evidence that the testing of more than four units is required).

6.4.4 Quarterly Post-Certification Report

The proposed rule calls for the submission of a quarterly post-certification report by certified mail for each basic model, beginning three months after the date of the certification report, which includes:

1. Substantive revision required to update the information contained in the product certification report (e.g., additions to or deletions from the model numbers being manufactured under a given basic model);

2. A description of other major events that might affect the energy efficiency of any covered product/model (e.g., modifications in production processes);

3. The number of energy efficiency tests performed according to DOE test procedures since the last quarterly report and the summary test data from each test; and

4. Schedules of anticipated production and energy efficiency testing.

6.4.5 Private Labeler Reporting Requirements

Private labelers are required to submit pre-certification, certification, and post-certification reports that conform to the same requirements prescribed for manufacturers for all basic models they distribute in commerce, with the exception that private labelers are not required to conduct certification tests to demonstrate the compliance of their products with DOE standards. In lieu of such tests, they may submit:

(1) A signed statement from the actual manufacturer that the required testing has been conducted and that the tests demonstrate compliance of the basic model.

(2) The date of the manufacturer's certification submittal to DOE.

(3) The location of the underlying test data.

Manufacturer and private labeler reporting requirements are summarized in Table 6–4.

6.4.6 Retention of Certification Test Units

The production unit, tested to satisfy a basic model's certification test requirements, which has the highest measured energy efficiency among all units included in the certification test sample, shall be retained by the manufacturer. The unit shall be retained in retestable condition for not less than two years after the basic model has ceased to be produced by the manufacturer. The proposed rule also provides for the retention of all other production test units for 30 calendar days after the date of filing of the statement of compliance and certification report unless DOE notifies the manufacturer to retain such units for an additional 120 days. The reason for this is to enable DOE to exercise its option to retest such units under section 430.72 of the rule to verify a manufacturer's certification statement of compliance.

If the manufacturer elects to submit a statement of compliance with a conditional certification report based on the testing of nonproduction units, then

the manufacturer must retain such nonproduction units. The nonproduction units must be retained in retestable condition until the manufacturer completes the certification production unit testing requirements.

Table 6-4.—*Summary of Required Submittals*

Name of report	Date of initial submittal	Requirements for additional submittals
Precertification report	Within 60 days after rule is published for existing models. At least 60 days prior to certification testing for new models.	None.
Conditional certification report	At least 60 days prior to distribution in commerce (based on testing of other than production units).	None.
Certification report (if not preceded by conditional certification).	Prior to distribution in commerce if based on production unit testing.	None, unless requested by the Secretary.
Certification report (if preceded by conditional certification.	Within 20 to 55 days (depending on product category) of the beginning of production, only if the product certification report is based on the testing of other than production units.	
Post certification report	Three months after the date of the product certification report.	Quarterly.

from which the units are to be selected, the batch sample and test sample selection plans, the date at which a DOE inspector will select the batch sample and test sample, the date at which testing shall begin, the date by which testing is scheduled to be completed and the facility at which testing will be conducted. The Test notice may provide for testing of alternative basic models where the selected basic model is unavailable for testing.

DOE may seek a judicial order restraining a manufacturer from distributing in commerce any covered product with respect to which a manufacturer refuses to comply with the provisions of a test notice issued by DOE pursuant to the rule or refuses to comply with any of the applicable provisions of the rule.

6.5.1 Supply of Products for Testing

DOE may request, in a test notice that a manufacturer supply at his expense a reasonable number of units of a specific basic model to any laboratory designated by the Secretary. The number of units of a basic model specified in a test notice shall not exceed twenty, unless units that are supplied fail to complete the test. All test data conducted under enforcement testing at a designated laboratory shall constitute official test data for that basic model. Such test data will be used by DOE for determination of compliance or noncompliance of the basic model being audited in accordance with applicable provisions of the rule if sufficient number of tests have been conducted in accordance with Appendix A of this subpart.

The manufacturer will be required to pay shipping expenses for those units supplied to the DOE designated laboratory. DOE will pay all test costs associated with performing the testing at the laboratory to the extent provided in appropriation Acts. Testing at the independent laboratory may be witnessed by the manufacturer, or his designated representative.

6.5.2 Enforcement Testing

Unless otherwise specified, DOE will require a first test sample size of four units. Fewer than four units may be specified in the first test sample by DOE, but in those situations no compliance or noncompliance determination will be made.

One test will be conducted in accordance with applicable DOE test procedures for each unit selected for testing. Compliance or noncompliance determinations are made according to the double sampling plan prescribed in Appendix A of the rule.

If a second test sample is required to obtain a compliance or noncompliance determination, the first test sample results will be used to determine the number of additional test units required to make a compliance or noncompliance determination in accordance with the requirements of Appendix A of the rule.

If, using the applicable provisions of Appendix A, a total required sample size exceeds 20, testing will be terminated after 20 units with the lower confidence limit (LCL) calculated for a test sample size of twenty. If the calculated LCL is less than 90 percent of the applicable energy efficiency level, the determination of compliance or noncompliance shall be made on the basis of an LCL equal to 90 percent of the energy efficiency level.

6.6 Other Certification and Enforcement Provisions

6.6.1 *Rights of Entry and Inspection.* Any inspection activities conducted by DOE inspectors will, among other things, be for the purpose of determining: (1) whether certification tests are being conducted pursuant to the requirements of this rule; (2) whether products manufactured for distribution in commerce conform to applicable standards; and (3) whether required records are being properly maintained. The DOE inspector shall be given entry to any facility or site of a manufacturer or private labeler during normal operating hours: where required tests are conducted or activities connected with such tests are or were performed; where any test unit is present; and where records, reports, other documents, or information required to be maintained or submitted are located.

The DOE inspector, upon entering the facility or site, will be furnished such reasonable assistance as may be necessary to complete his duties. A manufacturer, private labeler, or other person subject to the Act and this rule will be required to cause those in charge of a facility or site to furnish such assistance without charge to DOE.

The provision of right of entry shall apply whether the facility or site is owned or controlled by the manufacturer or private labeler. If a manufacturer enters into a contract with a testing laboratory to conduct required certification testing, such contract should include notice of DOE's right to observe such testing and to inspect the results thereof.

6.6.2 *Manufacturer Responsibility for Monitoring Compliance.* A manufacturer will be required to monitor the production of covered products after certification in order to assure continued

compliance of each basic model with applicable energy efficiency standards.

If, after a basic model has been certified by a manufacturer to be in compliance with applicable energy efficiency standards, the manufacturer has reason to believe that the mean energy efficiency level of the basic model is or may be below the applicable energy efficiency standard, the manufacturer will immediately notify DOE and provide a description of the information or event which gives rise to such belief; and take all necessary action to determine if the model is in noncompliance and the extent to which noncompliant units, if any, have been distributed in commerce. Failure to comply with these requirements may make the manufacturer subject to a civil penalty for a "knowing violation," as defined in the Act, or such other action as may be permitted by law.

6.6.3 *Prohibited Acts.* The prohibited acts which subject a manufacturer or private labeler to assessment of a civil penalty in accordance with Section 333 of the Act, are:

(1) Failure to permit access to, or copying of records required to be supplied under the Act and this rule, or fail to make reports or provide other information required to be supplied under the Act and this rule;

(2) Failure of a manufacturer to supply at his expense a reasonable number of covered products to a test laboratory designated by the Secretary;

(3) Failure of a manufacturer to permit a representative designated by the Secretary to observe any testing required by the Act and this rule and inspect the results of such testing; and

(4) Distribution in commerce by a manufacturer or private labeler of any new covered product which is not in compliance with an applicable energy efficiency standard prescribed under the Act and this rule.

The assessment of such civil penalties shall be for a knowing violation of a prohibited act. Such a violation is defined in the Act as: (1) the having of actual knowledge, or (2) the presumed having of knowledge deemed to be possessed by a reasonable man who acts in the circumstances, including knowledge obtainable upon the exercise of due care.

6.6.4 *Field Test Exemption.* A field test exemption may be granted by the Secretary to a manufacturer or private labeler, upon request, for the following purposes: research, investigations, studies, demonstrations, or training. The request shall include the number of units involved, the duration of the field test, the ownership arrangement of the units, and the final disposition of the units.

6.6.5 *Imported and Exported Products.* Noncomplying products may not be imported into United States commerce. Under the Act, the compliance of imported products with energy efficiency standards is under the jurisdiction of the Department of the Treasury. DOE and the Department of the Treasury are currently working on an agreement concerning the implementation of this statutory requirement.

Any covered product, intended for export, shall be labeled or marked "For Export Only" in an easily visible location on the outside of the container and on the product itself and shall be exempt from the prohibition and requirements of the Act and this rule.

6.7 Estimated Manufacturer Test Costs Under the Proposed Approach.

Additional costs incurred by manufacturers as a result of certification and enforcement requirements of the proposed rule relate primarily to the cost of manufacturer certification testing. The cost of supplying products to DOE (product plus shipping costs) for enforcement audit testing at testing laboratories results in an additional, but substantially lesser, cost element than manufacturer certification does. Other costs (e.g., completing the non-test-related portions of the product certification report) are considered relatively small. DOE solicits comments on the cost impacts to manufacturers and private labelers of these requirements.

Two types of testing are involved in the proposed rule: certification testing by the manufacturer and enforcement audit testing by DOE. Table 6–6 presents upper bound estimates of test-related costs to be incurred by manufacturers during the first year of the proposed Certification and Enforcement Program. Test costs in subsequent years will be substanially lower than those for the first year, since carryover models will not normally require additional certification testing.

Certification testing requires the testing of four or more production units by the manufacturer. The estimates given are based on an assumption that 75 percent of all basic models will be certified with a sample size of 4 and that the remaining 25 percent will require an average sample size of 8. This gives an average sample size of five production units per basic model tested for certification. In addition, it is assumed that 20 percent of all models are new, and that an average of two protype units are tested per new basic model to obtain conditional certification. The cost of testing to satisfy FTC labeling requirements (applicable to all products except for kitchen ranges, ovens and clothes dryers) has been eliminated from the estimates in Table 6–6.

It is also assumed that 20 percent of all basic models will receive enforcement test audits by DOE at test laboratories. These frequencies would result in the audit testing each year of virtually all models determined by DOE to be marginally close to the applicable standard.

Total manufacturer test costs appear small relative to the value of manufacturer shipments. For all products except central air conditioners, manufacturer test costs average less than 0.3 percent of the value of shipments during the first year of the proposed Certification and Enforcement Program, and even less in subsequent years. The upper bound estimate of manufactuer test costs for central air conditioners during the first year approximate 1 percent of the value of manufacturer shipments.

Table 6–6.—*Manufacturer First Year C/E Costs*

[Upper Bound Estimates]

Product	Test cost per basic model	Number of basic models	Total test costs ($000)	Value of manufacturer shipments (000,000)	Test costs as a percent of value of shipments
1. Furnaces and Boilers	[illegible]	[illegible]	$1,752	$622.8	[illegible]
2. Water Heaters	2,145	[illegible]	1,609	601.5	0.27
3. Refrigerators/Refrigerators-Freezers	1,720	[illegible]	[illegible]	2,118.2	0.01
4. Kitchen Ranges/Ovens (gas only)	3,801	[illegible]	[illegible]	[illegible]	0.14
5. Central Air Conditioners	3,853	1500	5,780	[illegible]	0.97
6. Clothes Dryers	2,280	50	114	478.5	[illegible]
7. Room Air Conditioners	1,337	[illegible]	1,069	1,100.5	0.10
8. Freezers	1,641	[illegible]	197	[illegible]	[illegible]
All products			11,564	6,374.3	0.18

6.8 Additional Certification and Enforcement Issues.

6.8.1 *Relationship between DOE Enforcement of Standards and Industry Trade Association Programs.* The Department of Energy's proposed rules include no utilization of existing or potential trade association testing and certification programs. (The manufacturer, of course, may utilize such programs in order to accomplish testing required for product certification, as long as all requirements of the proposed rule are accomplished.) DOE realizes that not all manufacturers are represented in the industry trade association programs. DOE has proposed a certification and enforcement plan for each of the covered products that will be applicable to all manufacturers and private labelers.

Consideration by DOE of trade association programs as they may impact DOE's enforcement approach requires an investigation of several issues to determine whether the public will be better served through the utilization of these programs. DOE solicits comments on:

(1) The effectiveness of liaison and advisory functions served to industry by trade associations and the extent to which these functions can be utilized by DOE;

(2) The potential benefits and concerns of utilizing trade associations as an intermediary between DOE and manufacturers;

(3) The criteria which should be established for initial acceptability of specific trade association programs and for monitoring the performance of these programs;

(4) How could the use of trade association programs distribute costs more equitably between large and small manufacturers;

(5) To the extent that DOE enforcement involves the use of proprietary information, could the use of trade associations mitigate the concerns of manufacturers without decreasing the usefulness of enforcement information; and

(6) The ability of DOE and the trade association to agree upon procedures for establishing the utility of specific trade association programs to assist DOE's program objectives.

DOE decision concerning possible utilization of industry trade association programs awaits further investigation of these issues. DOE requests comments on the applicability of industry programs for incorporation into the DOE's certification and enforcement program.

6.8.2 *Test Variability Among Different Test Facilities.* In accordance with today's proposed rule, the testing conducted to enforce the energy efficiency standards for consumer products would be conducted at testing laboratories selected by DOE. Such test results would be compared to the prescribed energy efficiency standard for the class of consumer product to which the tested basic model belongs to determine whether the basic model is in compliance with the applicable standard.

In adopting the proposed rule, DOE has evaluated procedures of existing industry certification programs for using testing laboratories to determine compliance. DOE notes that the approach of these industry certification programs is the same as that of the proposed DOE enforcement program, i.e., the results of the tests conducted by the designated test laboratory are taken to be correct, regardless of any difference between those results and the results obtained by tests conducted at a manufacturer's test facility.

To enable participating consumer product manufacturers to correlate test results obtained at their own test facility with those obtained at a certification test laboratory, industry certification programs have sponsored "round-robin" test programs. (Round-robin testing involves testing units at more than one facility). After a sufficient number of round-robin tests have been conducted, a manufacturer is able to predict the test results that would be obtained by a testing laboratory for a particular unit based on the results of tests conducted at his own facility.

Toward quantifying the variability in test results to be expected between different test facilities, DOE requested the National Bureau of Standards to evaluate this factor for all of the DOE test procedures for consumer products. To make these determinations, NBS calculated the combined effect of the contribution of allowable test conditions or test measurement tolerances specified in the measures of efficiencies of each of the test procedures. The results represent the variability to be expected between test facilities solely due to the allowable tolerances for testing. Variability due to random measurement, recording, calculation, or instrument error, etc., are not addressed by this analysis. For results of the analysis, refer to Table 6–7.

DOE is currently planning a round-robin test program for consumer products involving manufacturer's and testing laboratories. The effort, which will be headed by NBS, will assist manufacturers to estimate potential variability between their facilities and the testing laboratories.

6.8.3 *Small Manufacturer Concerns.* DOE recognizes that the proposed rules will not impact all manufacturers in the same way, and is particularly sensitive to potential adverse impacts on small manufacturers. Particular concern has been expressed by small manufacturers about (1) the possible need for large capital investments in new test facilities, and, (2) the extent to which manufacturer test facilities and technical staff will be diverted from necessary research and development and quality control activities unless adequate time is allowed to adjust to DOE-required efficiency testing.

DOE requests further comments on these potential impacts, as well as any financial data which is relevent for their assessments.

Table 6–7.—*Uncertainty of Measures of Efficiency Determined Using DOE Test Procedures*

Product	Uncertainty* (energy factor) (percent)
Refrigerators, refrigerator-freezers & freezers:	
1. Single temperature control w/o antisweat heater switch	±10
2. Single temperature control w/ antisweat heater switch	±12
3. Dual temperature control w/o antisweat heater switch	±13
4. Dual temperature control w/ antisweat heater switch	±15
Room air conditioners:	
1. Cooling capacity 5,000–10,000 Btu/hr	±8
2. Cooling capacity 10,000–20,000 Btu/hr	±5
3. Cooling capacity 20,000–38,000 Btu/hr	±3
Central air conditioners:	
1. Cooling only:	
a. Single speed compressor:	
i. Capacity <20K Btu/hr	±7
ii. Capacity 20K–38K Btu/hr	±6
iii. Capacity 38K–55K Btu/hr	±5
b. Two speed compressor, two compressors, or cylinder unloading:	
i. Capacity <20K Btu/hr	±9
ii. Capacity 20K–38K Btu/hr	±8
iii. Capacity 38K–65K Btu/hr	±6
2. Cooling and heating units:	
a. Single speed compressor:	
i. Capacity <20K Btu/hr	±11
ii. Capacity 20K–38K Btu/hr	±9
iii. Capacity 38K–65K Btu/hr	±7
b. Two speed compressor, two compressors, or cylinder unloading:	
i. Capacity <20K Btu/hr	±13
ii. Capacity 20K–38K Btu/hr	±11
iii. Capacity 38K–65K Btu/hr	±9
Clothes dryers:	
Energy factor	±2
Water heaters:	
Energy factor, electric	±1.5
Energy factor, gas	±2
Kitchen ranges and ovens:	
Energy factor, electric ovens, electric oven, self-cleaning, gas cooking top	±3
Energy factor, gas oven, gas oven, self-cleaning	±2
Furnaces:	
Annual fuel utilization efficiency	±4

*The probability that the measure of efficiency determined for any given product for any given test will fall within the uncertainty range specified is 95 percent.

Note.—DOE is currently involved in refining the uncertainty analysis performed on the test procedures to quantify the uncertainty of the measures of efficiencies by product class for each product type.

7. Effect on Other Law

DOE is today proposing to amend Subpart D of 10 CFR Part 430 entitled "Petitions for Prescription of a Rule to Supersede a State Appliance Energy Use or Efficiency Standard." This subpart was issued pursuant to section 327(b)(1) of EPCA which provided for the preemption of State energy efficiency standards once Federal standards were prescribed. States and manufacturers had the right to petition the Secretary of Energy to be exempted from preemption or to preempt a State standard, respectively.

The National Energy Policy Conservation Act amended section 327(b) to establish a period of automatic preemption of State standards prescribed after January 1, 1978. This automatic preemption of standards ends on July 1, 1980, for the thirteen consumer products listed in section 322(a) of the Act. The Act permits manufacturers to petition DOE for a rule preempting the State standards pending prescription of a Federal standard. After July 1, 1980, once a Federal standard is prescribed for any product, all State standards for such a product are preempted, regardless of when the State standard was enacted. The Act also permits States to petition DOE for a rule that a State energy efficiency standard or other requirement not be preempted.

Under NEPCA, the burden of proof for a petitioner who is a State has been modified. Under current law, the Secretary is required to determine the extent to which the State regulation would unduly burden interstate commerce. A petitioning State does not have to prove a negative prediction, i.e., that its State regulation would not impose an undue burden on interstate commerce.

These changes have been incorporated within the new rules proposed today. Procedures are prescribed for States to petition for a rule that a State energy efficiency standard or other requirement not be preempted; and or any person subject to such regulations to petition for a rule to preempt a State's standards. New informational submission requirements are proposed for petitioners in order to permit the Secretary to make the determinations required under the Act.

Small Business Exemptions

Pursuant to Section 325(e) of the Act, DOE today is proposing a new Subpart E to establish procedures by which manufacturers, whose annual gross revenues for the preceding 12-month period do not exceed $8,000,000, may petition DOE to be temporarily exempt from the standards. The exemption may be granted for a period of up to 24 months from the date such rule is prescribed for all or part of the energy efficiency standards. In establishing eligibility for the exemption, the annual gross revenues of any person who controls, is controlled by, or is under the common control with the petitioning manufacturer, are to be taken into account. Applications shall be submitted to the Secretary within 60 days from the date the standard was prescribed for which an exemption is sought. All firms affected by the same standard are required to file at the same time in order to enable the Secretary to make the requisite determination concerning competitive effects in the industry.

The purpose of this subpart is to enable manufacturers who could not comply with the standards to continue operations for a period of up to two years.

Section 430.54 details the relevant information which must be provided to DOE to permit the Secretary to make the determinations required under the Act. The necessary relevant information includes: annual financial statements, profit and loss statements, and balance sheets; annual gross dollar income resulting from the manufacture and sale of the covered product; estimates of the total costs and schedule necessary to comply with the applicable standard; a list of products manufactured by applicant and dollar volume of sales for each type or class of covered product; a list of principal manufacturers of the covered product and their respective market shares; evidence that applicant would be at an operational or financial disadvantage vis-a-vis other manufacturers; a description of applicant's efforts to comply with the standard; and a statement whether, at the end of the exemption period, applicant will be able to comply with the standard.

Section 430.55 outlines the steps applicant must take in filing the application, and the requirement that applicant is to notify all known manufacturers of domestically marketed units of similar product type of the application for exemption.

Sections 430.56 through 430.58 specify the procedures to be followed by DOE in granting or denying an exemption. The written views of the Attorney General shall be obtained prior to a finding by the Secretary that a failure to allow an exemption would likely result in a lessening of competition. Such a finding is required for each exemption granted. The decision reached by DOE and the reasons therefor are to be published in the **Federal Register.**

9. Environmental Assessment

In accordance with its obligations under the National Environmental Policy Act (NEPA) (42 U.S.C. 4321, *et seq.*) and the Council on Environmental Quality regulations implementing the procedural provisions of NEPA (40 CFR 1500–1508), DOE stated in the advance notice that it would prepare an Environmental Assessment on the impact of setting energy efficiency standards for the affected product types covered by this proposed rule. Subsequent to publication of the advance notice, other advance notices were published indicating that DOE is planning to develop energy efficiency standards for dishwashers, television sets, clothes washers humidifiers and dehumidifiers, and central air conditioners (heat pumps). In order to produce a comprehensive impact statement on all energy efficiency standards, thereby averting segmentation, the Environmental Assessment being made available for public comment at this time addresses the potential environmental impacts of all 13 consumer products.

The analyses indicated that air pollution and commitments of land and energy resources will decrease as a result of reducing future energy demand through the proposed standards. For example, emissions of sulfur oxides are projected to be reduced by up to 1.1. $\times 10^6$ tons per year and oxides of nitrogen by up to 423,000 tons per year; commitments of land to coal development will be reduced by as much as 6,000 acres per year; and production of solid waste will be reduced by 3.0 to 5.5 $\times 10^6$ tons per year of fly ash and .75 to 1.36 $\times 10^6$ tons per year of bottom ash.

Indoor air quality was found to be not significantly affected by implementation of standards. The exact effect could not be measured because the design options that will be selected by manufacturers for improving the efficiency of gas-burning products could not be ascertained. The program was found to have no significant effect on water quality, noise or air pollution levels.

An increase in the use of chlorofluorocarbons was projected, but this increase was found to be less than 4% of total U.S. production. Projected increases in the use of copper, steel, iron, aluminum, plastic and fiberglass were not considered to be significant when compared to total U.S. production. In addition, it was found that money saved from lower operating costs would be likely to be spent on goods and services in the general economy and therefore might stimulate additional

pollution which would not have occurred without the program. This amount was estimated to have no significant effect on future environmental quality.

The Environmental Assessment also summarizes the socioeconomic impacts of the program in a number of areas: change in the life cycle costs for consumers; the differential impact of the program on various income groups; change in the profitability to manufacturers of consumer products; the value of the program to the Nation as a whole and to various regions of the country; and secondary effects of the program on the national economy, including effects on employment, inflation, gross national product, and balance of trade. These socioeconomic impacts are more fully treated in the "Economic Analysis Document," TSD No. 4

Alternatives to the energy efficiency standards as proposed were assessed from the perspective of environmental impact. None of the alternatives analyzed was found to significantly affect the environment. The proposed action was found to benefit the environment to a greater degree than most alternatives considered. Those alternatives expected to benefit the environment to a greater degree than the proposed action were not selected for economic reasons.

Based on its evaluation of the Environmental Assessment, DOE has reached a finding of no significant impact regarding energy efficiency standards for consumer products, and therefore no environmental impact statement is required. The "Environmental Assessment," TSD No. 2 is available upon request, as indicated at the beginning of this notice.

410. Regulatory Analysis

Executive Order 12044, "Improving Government Regulations" (43 FR 12661, March 14, 1978), directs that all Federal regulations achieve their intended goals without imposing unnecessary burdens on the economy, on individuals, on public or private organizations, or on State and local governments. To this end, a Regulatory Analysis is prepared for significant major regulations. Such an analysis presents major alternatives to the regulation, examines the economic and administrative effects arising from each alternative and explains why one alternative was selected over the others.

DOE has determined that this proposed rule is significant and is likely to have a major impact on residential energy consumption and on manufacturers of consumer products. Accordingly, a Draft Regulatory Analysis has been prepared.

The Regulatory Analysis is summarized below. This summary focuses on the major alternatives considered in arriving at the proposed approach to improving the energy efficiency of consumer products. The reader is referred to the complete draft "Regulatory Analysis," TSD No. 1, which will be available for public comment as indicated at the beginning of this notice. It consists of: (1) a statement of the problem addressed by this regulation, and the mandate for government action; (2) a description and analysis of the feasible policy alternatives to this regulation; (3) a quantitative comparison of the impacts of the alternatives; (4) the economic impact of the proposed standard; (5) an analysis of urban and community impacts; and (6) other regulations and programs that might be affected by this regulation.

10.1 Major Alternatives

10.1.1 Alternatives for Achieving Consumer Product Energy Efficiency

Six major alternatives were identified by DOE as representing feasible policy alternatives for achieving consumer product energy efficiency. These alternatives include:

- No Regulatory Action
- Informational Action
  —Product labeling
  —Consumer education
- Prescriptive Standards
- Financial Incentives
  —Tax credits
  —Rebates
- Voluntary Energy Efficiency Targets
- The Proposed Approach (Performance Standards)

Each alternative has been evaluated in terms of its ability to achieve significant energy savings at reasonable costs, and has been compared to the effectiveness of the proposed regulation.

If "no regulatory action" were taken, then no standards would be implemented for any of the covered products. In this case, some energy savings would occur due to other government actions such as the consumer product labeling program, Building Energy Performance Standards, DOE's public education and information program, State standards, and the deregulation of energy prices.

Several alternatives to this regulation can be grouped under the heading of informational action. They include consumer product labeling and DOE's public education and information program. Both of these alternatives are mandated by the Act, and are currently underway. Consumer product standards, labeling, and consumer education were designed by Congress to act together to promote energy conservation in the residential sector. DOE has determined that neither the labeling nor the public education and information alternatives could stand alone and even approach the expected savings attributable to consumer product efficiency standards.

Prescriptive standards (i.e., intermittent ignition devices, flue dampers) would also fail to achieve the effectiveness of the proposed performance standards. In order for DOE to prescribe standards that could duplicate the projected energy savings under the proposed regulation, DOE would essentially have to specify designs of the thousands of models of consumer products produced. The time and costs involved with doing this would be prohibitive, and the results would tend to stifle competition in the industry.

Another method of prescribing standards would entail requiring that certain design options be used on each product. The effect of this alternative would be to lower energy savings while increasing the cost of regulation and decreasing competition in the industry.

Financial incentives are another group of alternatives that have been considered. They include tax credits, rebates, low interest financing and loan guarantees. Rebates for the purchase of more efficient consumer products were found to have costs which could significantly outweigh benefits. This alternative, although potentially beneficial to consumers, would provide limited incentives to manufacturers for the production of more efficient products. The length of time over which the rebate would be extended was also a factor in rejecting this alternative. A long-term program could be very costly, while a short-term program may not achieve lasting benefits.

The alternative of providing tax incentives for purchasing or manufacturing energy efficient products was also considered by DOE. Many of the same problems that were anticipated in the rebate alternative were also pertinent to this alternative. In both programs, the majority of the associated costs would be borne by the Federal government, i.e., distributed among all taxpayers, while the benefits would be derived only by the purchasers of covered products. Thus, on an individual consumer basis, the costs would outweigh the benefits for those taxpayers who do not purchase the covered products.

Several other financial incentives designed to stimulate the purchase or production of energy efficient products

were considered by DOE. Concepts such as providing low interest financing through utility companies for purchase of energy efficient products or low interest loans to low income groups who might have more difficulty in purchasing the higher priced energy efficient products. Such concepts were not considered to provide viable alternatives to the proposed approach in that they could not reasonably achieve the same energy savings that would accrue under the proposed approach.

EPCA called for industry to set up voluntary energy efficiency targets for the covered products. In amending the Act (NECPA) (Pub. L. 95–619), Congress specifically changed this section of the legislation to provide for immediate establishment of mandatory Federal standards. Therefore, voluntary standards are no longer a viable alternative for consideration.

Under the proposed approach, the energy efficiency standards are performance standards. The standards will establish the minimum energy efficiency level (MEEL) required to be achieved by each product type, but will not prescribe the means by which that level is to be reached. The levels are specified by energy factors which relate to the energy efficiency of the particular product type. The MEELs vary from product to product, depending upon their design limitations.

Expected Impacts of Program Alternatives

In Table 10.1–1, each of the program alternatives are evaluated in terms of their expected energy savings, costs, feasibility and national net present value. As the comparison shows, the proposed approach results in appreciably higher energy savings and a greater national net present value than any of the alternatives.

10.1.2 Alternatives Available Within the Proposed Approach. Within the legal framework of the Act there are several alternatives available to DOE in setting performance standards. These include various national regulatory levels, regional regulatory levels for certain consumer product types and alternative phase-in periods.

In determining the standard levels selected for this proposed regulation, a process to identify the standard level offering the maximum potential benefits was developed. This process considered the following options:

- Four alternative regulatory levels for 1981 standards and four alternative regulatory levels for 1986 standards;
- Regional standards for consumer products exhibiting significant climatological use differences; and
- No regulation (in cases where none of the above standards is economically feasible).

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Table 10.1-1. Expected Impacts of Program Alternatives

Alternative \ Impacts	National Energy Policy: Energy Use (QBtu's)	National Energy Policy: Energy Savings (QBtu's)	Net Present Value for Fuel and Equipment (in billions) (in 1978 $s)	Equity Impacts*	Legislative Authority	Major Barriers to Implementation/ Enforcement	Competition	Compliance and Reporting Requirements**
No action	436.3 to 460.4	0	None	Inequities between states due to nonuniform standards	***	None	None	None
Tax Credits (Consumers)	435.9 to 460.2	.4 to .2	$ .48 to $ .98	Some costs will be borne by all taxpayers regardless of purchase of energy efficient product	No	None, other than legislative	May favor large manufacturers	Could be unwieldy
Tax Credits (Manufacturers)	433.7 to 456.7	2.6 to 3.7	$ .39 to $ .79	"	No	Enforcement problems likely	"	"
Rebates (Consumers)	435.7 to 460.0	.6 to .4	$ .80 to $1.64	"	No	Potential difficulties in administration	"	"
Prescriptive Standards	428.2 to 444.9	8.0 to 15.5	$ 9.24 to $12.13	None	No	Restricts development of innovative technology	May reduce number of models and competition	Minimal reporting but extensive testing
Voluntary Energy Efficiency Targets — 5-yr. delay	429.8 to 445.9	6.5 to 14.5	$ 5.45 to $ 8.36	None	No	No assurance that participation will be widespread	None	None
Voluntary Energy Efficiency Targets — 10-yr. delay	433.8 to 453.6	2.4 to 6.8	$ 1.45 to $ 2.79					
Enhanced Labeling and Consumer Education	434.2 to 457.7	2.2 to 2.7	$ 3.28 to $ 3.52	None	Yes	None	None	Minimal
Performance Standards	422.6 to 435.5	13.6 to 24.9	$15.27 to $19.27	None	Yes	None	Not anti-competitive	Reasonable

Key: None = 0, or not significant
QBtu's = 10^{15} Btu's of energy or one quadrillion Btu's

NOTES: * Economic well-being of Nation as a whole.
** Interpreted to apply only to regulatory programs, not as a measure of effectiveness.
*** Yes, if no standard is justified.

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Alternative Levels

The trial levels for analysis in the formulation of 1981 standards were defined separately for all product classes. For each such class a sales weighted average efficiency factor (SWEF) for 1978 was determined from survey data. This SWEF defined the second level of analysis for each class. The first level of analysis was determined by subtracting the 1978 standard deviation of efficiency from the SWEF. Levels three and four were determined respectively by adding one and two standard deviations to the SWEF.

The four candidate levels analyzed in the formulation of product class specific standards for 1986 were derived as follows:

- level four was based on implementation of advanced technologies.
- level three was near the maximum product class efficiency factor considered to be attainable through conventional technologies (manufacturing processes currently applied on a wide scale).
- level two and one were derived by scaling down level three. This scaling down represented DOE's judgement regarding alternative burdens on manufacturers and was taken to provide a lower bound for choosing the preferred alternative.

Regional Standards

A major option in determining the format of the energy efficiency standards considered by DOE was the possibility of setting regional standards, as opposed to nationally uniform standards, for all covered products. The concept of regional standards was rejected for all covered products except for central air conditioners, room air conditioners and furnaces, where the use of the product is highly dependent on the climatic zone in which it is operated.

Based on analysis of the national proposed levels, DOE determined that regional standards were not feasible because of potential impact on manufacturers and consumers. However, as the national standards are lowered, the benefit of regional standards increases. The analysis of regional standards was based on three climatic regions, and considered standard levels 2, 3 and 4.

The results illustrate that for the products studied, and given sufficiently low national standards, regional standards (as opposed to a single national standard) could yield appreciable reductions in energy consumption in light of their potential impacts on manufacturers and product prices. The relative magnitudes of impacts associated with regional standards (the percentage reductions in consumption and cost) for each product are presented in Table 10.1–2.

Table 10.1–2.—*Regional Standards Energy Consumption*

Product	Reductions in energy consumption (percent)
Room air conditioners	5.0
Central air conditioners	3.7
Gas furnaces	1.0
Oil furnaces	Less than 1.0

An examination of these savings indicates the largest energy and cost savings occur for room and central conditioners. Even in these cases, the annual reduction in energy consumption does not exceed 5%. For oil and gas furnaces, both consumption and cost savings are shown to be much less.

The reduction in energy consumption and energy cost detailed in this section are part of the "benefit" portion of a cost/benefit analysis for regional standards implementation.

Costs associated with regional standards include increased manufacturing and distribution costs, substantially higher certification and enforcement costs and higher purchase prices to consumers. Quantitative data on these types of costs are generally not available and where available are fragmentary at best. Analysis indicated that equipment cost increases greater than approximately 4% for central air conditioners, 20% for room air conditioners, and 12% for furnaces would negate the fuel cost savings of regional standards. Further discussion on this subject can be found in the "Regulatory Analysis" and the "Economic Analysis Document."

Alternative Phase-In Periods

Section 325(c) of the Act allows for the phasing-in of standards over a period of up to 5 years through the establishment of intermediate standards. Use of the full 5-year period would provide manufacturers with the greatest possible planning and development time allowing them maximum flexibility in meeting final standards. Accordingly, DOE plans to utilize the full phase-in period and has proposed final standards which are to be achieved by January 1986. To assure that manufacturers make steady progress toward the 1986 standards, intermediate standards are proposed, to be effective no earlier than July 1981, 180 days after the final rule is prescribed. These intermediate standards take into account the short lead time manufacturers will have to make design changes.

10.2 Economic Impact of the Proposed Standards

The proposed consumer product efficiency standards will result in impacts on both consumers and manufacturers of the products. In addition, there will be national economic impacts. Potential economic impacts on consumers are: 1) higher purchase price, and 2) lower energy cost of operation. Manufacturers will probably experience: 1) retooling and equipment costs, 2) changes to sales volume, and 3) changes to sales revenue. Potential national impacts include: 1) changes in gross national product, 2) changes in energy consumption, and 3) changes in income distribution and employment.

The economic analyses performed in support of the proposed standards focused on studying the above impacts for each covered product. For each product, the economic impact of serveral potential standards were evaluated. Four levels were evaluated for 1981 standards, and three of four levels were evaluated for 1986 standards. The complete economic analysis is presented in the "Economic Analysis Document" TSD No. 4.

10.2.1 Effects of the Proposed Standards on Consumers. The major impact of the proposed standards on consumers will be an increase in the purchase price of consumer products and a decrease in the cost of product operation.

The gross consumer benefit accruing from regulation is defined as the net savings accruing to the consumer as a result of reduced product life cycle costs.

In every case, the proposed standard results in life cycle cost savings to the consumer. The benefits to the average consumer are expected to range from $6 in 1978 dollars for gas clothes dryers to $624 in 1978 dollars for gas, indoor boiler furnaces for the selected regulatory levels.

The distribution of impacts of the regulation among consumers of varying income levels was also examined. The analysis indicates that the proposed standards will have a small but positive differential impact on lower income groups.

10.2.2 Effects of the Proposed Standards on Manufacturers

The proposed standards will result in changes to manufacturers' costs, sales,

profits and financial position. These impacts were analyzed by examining manufacturer requirements, financing alternatives and shipment levels for the proposed standards and in the absence of regulation. Profit to net worth ratio and the ability of firms to finance capital costs of compliance were the key impact measures used to evaluate standards.

Firms will require additional capital equipment, tooling, etc., in order to produce products in compliance with the standards. This will force an increase in asset levels. However, these assets will be partially or wholly financed by increases in short- and long-term debt. The debt burden will fall more heavily on smaller firms; moreover, their ability to finance without incurring debt is less than it would be for larger firms. However, the Small Business Exemptions proposed today in Subpart E are expected to lessen the impacts on smaller firms.

Manufacturer impacts vary by size of firm and by products produced. For a more detailed discussion of manufacturer impacts, see section 4 of this notice and the draft "Economic Analysis Document," TSD No. 4.

10.2.3 Effects of the Proposed Standards on the National Economy. Key indicators of the impact of consumer product efficiency standards on the national economy are measured by total energy savings and national net present value. The national net present value of the proposed standards on all product types combined is estimated to be between $15.2 billion and $19.3 billion over the time period 1982–2005. Total energy savings from the program will range between 13.8 QBtu and 25.2 QBtu.

The proposed regulations will also have a positive impact on the gross national product (GNP). The GNP is expected to rise by $0.6 billion in 1986, by $2.5 billion in 1990, by $4.6 billion in 1995, and by $5.3 billion in 2000 as a result of the program. In addition, no inflationary impacts are expected in that the GNP deflator shows either no change or negative change. The incremental change in the U.S. balance of trade will be $0.3 billion in 1986, $1.2 billion in 1990, $2.5 billion in 1995, and $1.7 billion in 2000.

The production of energy efficient products will result in increased employment in the industry. Some jobs will be created to develop, design and produce energy efficient products. Employment will also rise as increases in disposable income, resulting from fuel cost savings, are spent on other goods and services. By 1986, the proposed regulations are expected to increase employment in all industries by 30,000 jobs. The increase is expected to rise to 110,000 jobs by 1990, to 190,000 in 1995 and to 220,000 in 2000.

10.2.4 Effects of Certification and Enforcement Costs. The certification and enforcement costs for the program are expected to be a small percentage of the total cost of the product. Using the worst case scenario where the anticipated number of certification tests is maximized, the costs range from 0.02% of the value of shipments for refrigerators and refrigerator-freezers and 0.58% for central air conditioners (cooling only) for the first year. In subsequent years, the costs will decrease in that only a limited number of carry-over models will be required to be retested. The certification and enforcement costs include certification test costs, the cost to manufacturers when DOE conducts enforcement audits and administrative costs. Further discussion of the impacts of certification and enforcement can be found in section 6 of this preamble and the "Certification and Enforcement Document," TSD No. 3.

10.3 Urban and Community Impact Analysis

In accordance with Presidential Executive Order 12044, an "Urban and Community Impact Analysis" is required in order to assess the probable effects of proposed agency initiatives on central cities, suburban communities, and non-metropolitan areas. In complying with this mandate for the proposed energy efficiency standards for products, it should be noted that there is only a limited amount of data available on the geographic distribution of consumer product plant locations and the number of employees per plant. Moreover, in the absence of a survey of each manufacturer, there is no data base that could be researched to determine the composition of the work force at each plant. However, there is information available that broadly indicates the current employment picture on a national and statewide basis and the changes that have occurred during the 1970's.

The conclusions reached in the Regulatory Analysis indicate that it is apparent that employment shifts in the consumer product industry have occurred in recent years due to a variety of market factors. Accordingly, it is not believed that energy efficiency standards will have any noticeable impact on either exacerbating or mitigating this trend since many other factors are far more significant in causing plant shutdown or relocations from older manufacturing areas. However, the imposition of the standards may have a minimal secondary effect (which may not be readily identifiable) by increasing costs to financially weak firms that may then become acquisition targets with a resulting shift of facilities and employment.

The economic analysis of the impacts of the proposed standards on manufacturers indicates that employment will increase as a result of the proposed standards. Some employment increases will occur in the consumer product manufacturing industry. Additional employment increases will occur in other industries as a result of the increased disposable income available to purchasers of the regulated consumer products to spend on additional goods and services.

While these employment increases may counteract the downward employment trends in the consumer product industry, the proposed regulations are unlikely to affect shifts of plant locations away from the northeastern region of the United States.

The effect of the proposed regulation on various income groups within the population was examined in the economic analysis. No adverse impacts on low income or minority groups were identified.

The distribution of impacts of the regulation among various regions of the U.S. was also examined in the economic analysis. No one region of the nation is expected to be impacted more severely than another.

In the summary, the overall impact of the regulation on cities, suburban communities, and non-metropolitan areas is expected to be beneficial in that demand for energy will be reduced without lowering the utility provided by the covered products. In addition, this reduced demand may serve to mitigate possible future energy shortages, such as brownouts, in urban areas. Reduced demand could serve to keep energy prices lower than may have been possible without the proposed regulations.

10.4 Significant Conservation of Energy.

Section 325(b) requires, among other things, that no standard can be prescribed for a product type or class if the standards do not result in significant conservation of energy. When energy conservation was analyzed, it was found that certain classes of products only had design options that would result in marginal conservation. DOE reviewed the provisions of the Act and determined for purposes of this notice that significant conservation of energy is:

• Product type—energy conservation must exceed 840 million kilowatt hours (2.867×10^{12} Btu) per year; and

• Product class—energy conservation must exceed 30 kilowatt hours (102,390 Btu/product/year/unit.

These levels are based upon applying the 20% efficiency improvement specified in Section 325(a)(1)(B) of EPCA as the minimum improvement and the criteria specified in 325(a)(2) of the Act for determining whether a standard should be set for a category 14 product. More specifically the aggregate household energy use of all products within a type or class must exceed 4.2×10^9 kilowatt hours per year and average per household kilowatt hours per year.

For further details on the specific methodology for determining significant conservation of energy the reader is referred to the "Economic Analysis Document," TSD No. 4.

10.5 Summary

The adoption and implementation of the proposed standards, supplemented by labeling and educational programs, represent a balanced mix of actions that will achieve notable energy savings. The principal advantages over other alternatives can be briefly summarized:

• The use of national and uniform performance standards will enable manufacturers to design innovative approaches that will yield increased cost benefits to consumers.

• In emphasizing life cycle costing, consumers will be able to make more rational product purchase decisions that will result in long term energy and cost savings.

• The costs to government will be minimized and the competitive nature of the consumer product marketplace will be essentially maintained in that consumers will have a range of product for selection purposes.

• The proposed approach results in greater net present value and energy savings than any other approach considered.

11. Public Comment Procedure

11.1 Participation in Rulemaking

Because of the direct impact of the standards on individual consumers, DOE wishes to achieve in the standards development process the maximum level of consumer participation possible. Following publication of the advance notice related to the forthcoming energy efficiency standards, DOE held a total of seven public meetings to acquaint the public with the issues relating to the standards and invited public participation in the rulemaking process. The Department encourages consumers and manufacturers to attend a public meeting that will be held in Washington, D.C., at the time and place indicated at the beginning of this notice, to present questions, if necessary, to clarify the information presented in this notice. The Department also encourages attendance at the public hearings to be held in Washington, D.C., and Chicago, Illinois at the times and places indicated at the beginning of this notice.

Representatives of consumer groups, manufacturers' associations, individual consumers, manufacturers and other interested parties are also urged to submit written statements regarding the standards program during the 60 day written comment period following publication of this notice.

11.2 Comments on Issues

Issues and questions relating to the development of standards are found throughout this notice. The following list of issues, while highlighting some of the major areas of interest to DOE, is not intended to be comprehensive and should not be construed as limiting the scope of comments relating to the notice.

1. DOE intends to phase in standards over a five-year period as described in this notice, with the final standards becoming effective in January 1, 1986 and with intermediate standards becoming effective in July 15, 1981. DOE is interested in comments relating to the appropriateness of this schedule.

2. DOE has indentified the product types and classes to which standards are to apply. Product classes were selected based on three criteria. First, product types were divided by the type of energy (electricity, gas, oil) the product consumed; second, groupings were established within energy types by taking into account utility and performance-related features; and third, these groupings formed the basis for product classes only when it was determined their energy efficiency was inherently different from similar groupings without the performance-related features. No separate class was established if the product grouping with the performance-related features could meet the same energy efficiency standard as the product grouping without the performance-related features. DOE would like to receive comments pertaining to the proposed classes. If additional classes are recommended, the recommendations should include the rationale for the establishment of such classes based on the three class selection criteria discussed in section 1.3.2. of this notice.

3. For purposes of this notice, DOE has defined "maximum technologically feasible energy efficiency level" in section 2 of this notice. DOE invites comments on this definition and on the efficiency levels.

4. DOE's approach to the development of an energy efficiency standard certification and enforcement program has been discussed in section 6. DOE is particularly interested in receiving comments on the following aspects of the approach:

(a) Information on the impacts of the proposed sampling plan relating to the certification and the enforcement aspects of the rule and whether the testing of four units is a sufficient sample size to reach a compliance or non-compliance determination;

(b) Information on the data reporting and recording requirements for manufacturers and private labelers. Such information should be provided in terms of estimates of the time in manhours necessary to complete each data form and the associated cost. (Whenever an element is presently being recorded by a manufacturer or private labeler as part of its own record retention or reporting procedurers, the manhour and cost estimates for recording and reporting the data requirement should reflect only the manhours and cost associated with the transcription and submittal of the data to DOE);

5. Congress identified seven factors which must be considered to the extent practicable in determining the economic justification of a standard. In section 1, DOE has listed these factors. DOE is interested in comments relating to the analysis conducted pursuant to these factors.

6. DOE has proposed energy efficiency standards for classes of refrigerators and refrigerator-freezers, freezers, clothes dryers, kitchen ranges and ovens, and water heaters that are functions of volume. The basis for the selection of these functional relationships are explained in section 4. DOE would like to receive comments on the analyses.

7. DOE is interested in receiving specific comments on the potential adverse impact of this rule on small businesses and adequacy of the small business exemption provisions provided in the rule, and (a) whether the Act's exemption for businesses with $8,000,000 in gross revenues is adequate to mitigate any adverse impact of the rule on small manufacturers, especially in view of inflation and (b) what, if any, modification of that provision would be desirable.

11.3 Comment Procedures

Interested persons are invited to participate in this proceeding by submitting, to the address indicated at the beginning of this notice, data, views or arguments with respect to the subjects set forth in this notice. It is requested that comments for each product type be addressed separately and that comments regarding the certification and enforcement provisions be addressed separate from the product specific comments.

Comments should be labeled both on the envelope and on the documents, "Energy Efficiency Standards for Consumer Products, (Docket No. CAS–RM–78–110)." Fifteen copies are requested to be submitted, but this is not a requirement for submitting comments.

Pursuant to the provisions of 10 CFR 1004.11, any person, submitting information or data which is believed to be confidential and exempt by law from public disclosure, should submit one complete copy, and fifteen copies from which the information believed to be confidential has been deleted.

Factors of interest to DOE when evaluating requests to treat as confidential information that has been submitted include: (1) a description of the item; (2) an indication as to whether and why such items of information have been treated by the submitting party as confidential, and whether and why such items are customarily treated as confidential within the industry; (3) whether the information is generally known or available from other sources; (4) whether the information has previously been made available to others without obligation concerning its confidentiality; (5) an explanation of the competitive injury to the submitting person which would result from public disclosure; and (6) an indication as to when such information might lose its confidential character due to the passage of time. In accordance with the procedures established at 10 CFR 1004.11, DOE shall make its own determination with regard to any claim that information submitted be exempt from public disclosure.

Any comments received before the close of the comment period as specified at the beginning of this notice will be considered by DOE in developing the final standards. The comment period will extend over a period of 60 days as required by applicable law and regulation.

11.4 Oral Presentation: Conduct of Meeting

The purpose of the public meeting is to provide interested persons an opportunity to become more familiar with this notice. Interested parties may present written questions regarding this rule for the purpose of clarification of issues. Written questions must be submitted to DOE by the date specified at the beginning of this notice and should be labeled both on the document and the envelope, "Energy Efficiency Standards for Consumer Products (Docket No. CAS–RM–78–110)" and should be sent to the address indicated at the beginning of this notice. Persons attending this meeting will also have an opportunity to question those persons making written or oral presentations with respect to disputed issues of material fact. Any futher procedural rules needed for the proper conduct of the meeting will be announced by the presiding officer.

A transcript of the meeting will be made, the entire record of the meeting including the transcript, and the written responses to questions, will be retained by DOE and made available for inspection at the DOE Freedom of Information Office in the Forrestal Building, 1000 Independence Avenue SW., Washington, D.C. 20585, between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday. Any person may purchase a copy of the transcript from the transcribing reporter.

11.5 Oral Presentation: Conduct of Hearings

Any person who has an interest in these proceedings, or who is a representative of a group of persons having an interest, may make a written request for an opportunity to make an oral presentation at the public hearings. Such requests should be labeled both on the document and on the envelope, "Energy Efficiency Standards for Consumer Products, (Docket No. CAS–RM–78–110)" and should be sent to the address indicated at the beginning of this notice, by the time specified.

The person making the request should briefly describe the interest concerned, and if appropriate, state why he or she is a proper representative of the group that has an interest, and give a phone number where he or she may be contacted. Each person selected to be heard will be so notified by DOE by the date specified at the beginning of this notice.

Each person selected to be heard must submit fifteen copies of his statement by the date given at the beginning of this notice. In the event any persons wishing to testify cannot meet this requirement, alternative arrangements can be made with the Office of Hearings and Dockets in advance by so indicating in the letter requesting to make an oral presentation.

DOE reserves the right to select the persons to be heard at these hearings, to schedule the respective presentations, and to establish the procedures governing the conduct of the hearings. The length of each presentation may be limited, due to the number of persons requesting to be heard. The official conducting the hearing will accept additional comments or questions from those attending, as time permits.

The hearings will not be judicial or evidentiary-type hearings, but will be conducted in accordance with section 553 of title 5, United States Code. Except during those periods when comments or questions are requested from the floor, questions will be asked only by the persons conducting the hearing. Any further procedural rules needed for the proper conduct of the hearing will be announced by the presiding officer.

A transcript of the hearings will be made, and the entire record of the hearings including the transcript, will be retained by DOE and made available for inspection at the DOE Freedom of Information Office in the Forrestal Building, 1000 Independence Avenue SW., Washington, D.C. 20585 between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday. Any person may purchase a copy of the transcript from the transcribing reporter.

In consideration of the foregoing, it is proposed to amend Part 430 of Chapter II of Title 10, Code of Federal Regulations, as set forth below.

Issued in Washington, D.C.

Dated: June 19, 1980.

John C. Sawhill,

Deputy Secretary.

1. Section 430.1 is revised to read as follows:

§ 430.1 Purpose and scope.

This part establishes the regulations for the implementation of Part B of Title III (42 U.S.C. 6291–6309) of the Energy Policy and Conservation Act (Pub. L. 94-163), as amended by Pub. L. 94–385 and Pub. L. 95–619, which establishes an energy conservation program for consumer products other than automobiles.

2. Section 430.2 is amended by deleting the present definitions of "Act," "Administrator," and "Basic Model with respect to subparagraphs (5), (6), and (14)" and inserting the following items in alphabetical order:

§ 430.2 Definitions.

* * * * *

"Act" means the Energy Policy and Conservation Act (Pub. L. 94–163), as

amended by the National Energy Conservation Policy Act (Pub. L. 95–619).

* * * * *

"Basic model"

(5) With respect to water heaters, which have the same primary energy source and which do not have any differing electrical, physical, or functional characteristics that affect energy consumption.

(6) With respect to room air conditioners, which have electrical characteristics that are essentially identical and which do not have any differing physical or functional characteristics that affect energy consumption.

* * * * *

(14) With respect to furnaces, which have the same primary energy source, which have electrical characteristics that are essentially identical, and which do not have any differing physical or functional characteristics that affect energy consumption.

* * * * *

"Batch" means a collection of production units of a basic model from which a batch sample is selected.

"Batch sample" means the collection of units of the same basic model from which test units are selected.

"Batch sample size" means the number of units in a batch sample.

"Batch size" means the number of units in a batch.

* * * * *

"Commerce" means trade, traffic, commerce, or transportation:

(a) between a place in a State and any place outside thereof, or

(b) which affects trade, traffic, commerce, or transportation described in subparagraph (a).

* * * * *

"Consumer product" means any article (other than an automobile, as defined in section 501(1) of the Motor Vehicle Information and Cost Savings Act) of a type:

(a) which in operation consumes, or is designed to consume, energy; and

(b) which, to any significant extent, is distributed in commerce for personal use or consumption by individuals; without regard to whether such article of such type is in fact distributed in commerce for personal use or consumption by an individual.

* * * * *

"Covered product" means a consumer product of a type specified in section 322 of the Act.

* * * * *

"Distribute in commerce" and "distribution in commerce" mean to sell in commerce, to import, to introduce or deliver for introduction into commerce, or to hold for sale or distribution after introduction into commerce.

"Distributor" means a person (other than a manufacturer or retailer) to whom a consumer product is delivered or sold for purposes of distribution in commerce.

* * * * *

"Energy efficiency standard" means a performance standard:

(a) which prescribes a minimum level of energy efficiency for a covered product, determined in accordance with test procedures prescribed under section 323 of the Act, and

(b) which includes any other requirements which the Secretary may prescribe under section 325(j) of the Act.

* * * * *

"Horizontal furnace" means a furnace where the blower is located beside the heat exchanger with the air entering one end, traveling horizontally through the blower and over the heat exchanger and discharging out the opposite end.

* * * * *

"Manufacture" means to manufacture, produce, assemble or import.

"Manufacturer" means any person who manufacturers a consumer product.

* * * * *

"Model" means all units within the manufacturers classification of a product line with are identical with respect to consumer-discernible characteristics, except for serial number or similar identifying marks.

* * * * *

"New covered product" means a covered product the title of which has not passed to a purchaser who buys such product for purposes other than (a) reselling such product, or (b) leasing such product for a period in excess of one year.

"Nonweatherproof furnace" means a furnace that is not able to withstand exposure to weather without damage or loss of function.

* * * * *

"Operating hours" means:

(a) Where product storage areas or facilities are concerned, all times during which personnel other than custodial personnel are at work.

(b) Where facilities or areas other than those covered by subparagraph (a) are concerned, all times during which product manufacture or assembly is in operation or all times during which product testing or maintenance, production, or compilation of records is taking place, or any other procedure or activity related to testing, product manufacture or assembly is being performed.

* * * * *

"Outdoor side louvers" means a series of slotted or slitlike openings on the sides of the outside portion of a room air conditioner. Side louvers separate the air streams to and from the condenser and reduce recirculation of cooling air.

"Person" means (a) any individual, (b) any corporation, company, association, firm, partnership, society, trust, joint venture, or joint stock company, and (c) the government and any agency of the United States or any State or political subdivision thereof.

* * * * *

"Private labeler" means an owner of a brand or trademark on the label of a consumer product which bears a private label.

"Production unit" means an individual covered product which has been produced or assembled using the manufacturer's normal production processes for units to be distributed in commerce.

* * * * *

"Reasonable assistance" means providing timely and unobstructed access to facilities, products and records as required by this regulation and opportunity for copying such records or testing such test units.

* * * * *

"Retailer" means a person to whom a consumer product is delivered or sold, if such delivery or sale is for purposes of sale or distribution in commerce to purchasers who buy such product for purposes other than resale.

"Reverse cycle room air conditioner" means a room air conditioner which utilizes an indoor conditioning coil, compressor(s), and refrigerant-to-outdoor-air heat exchanger to provide air cooling, and which also provides air heating.

* * * * *

"State" means a State, the District of Columbia, Puerto Rico, or any territory or possession of the United States.

"State regulation" means a law or regulation of a State or political subdivision thereof.

* * * * *

"Test sample" means the collection of test units of the same basic model of a covered product used to determine compliance with an applicable energy efficiency standard, pursuant to the requirements of Subpart F.

"Test sample size" means the number of units in a test sample.

"Test unit" means a unit of any covered product selected for, and is the

subject of, any testing pursuant to the requirements of Subpart F.

* * * * *

(Part B, Title III, Energy Policy and Conservation Act, Pub. L. 94–163 (42 U.S.C. 6291–6309) as amended by Pub. L. 94–385 and Pub. L. 95–619)

3. Subpart C of Part 430 is revised to read as follows:

Subpart C—Energy Efficiency Standards

Sec.
430.31 Purpose and scope.
430.32 Intermediate and final energy efficiency standards.
430.33 General provisions.

Subpart C—Energy Efficiency Standards

Authority: Sec. 325, Energy Policy and Conservation Act, Pub. L. 94–163, as amended by Pub. L. 95–619 (42 U.S.C. 6295).

§ 430.31 Purpose and scope.

This subpart contains energy efficiency standards for classes of covered products that are required to be prescribed by the Department of Energy pursuant to Section 325(a) of the Act.

§ 430.32 Intermediate and final energy efficiency standards.

The intermediate and final energy efficiency standards for the classes of covered products set forth in paragraphs (a) through (n) of this section shall become effective July 15, 1981 and January 1, 1986, respectively.

(a) *Refrigerators and refrigerator-freezers.*

Product class	July 15, 1981	January 1, 1986
1. Electric refrigerator; manual defrost.	1.20 + 0.524V	11.04 + 0.474V
2. Electric refrigerator-freezer; manual defrost freezer.	0.06 + 0.400V	6.29 + 0.432V
3. Electric refrigerator-freezer; automatic defrost with top freezer.	1.69 + 0.178V	4.91 + 0.183V
4. Electric refrigerator-freezer; automatic defrost with side freezer.	3.19 + 0.09V	5.20 + 0.082V
5. Electric refrigerator-freezer; automatic defrost with bottom freezer.	4.5	8.1
6. Electric refrigerator-freezer; automatic defrost with top freezer and through-the-door ice or liquid service.	5.4	7.4
7. Electric refrigerator-freezer; automatic defrost with side freezer and through-the-door ice or liquid service.	4.7	6.3

V = Total unadjusted volume, expressed in ft.³

(b) *Freezers.*

Product class	July 15, 1981	January 1, 1986
1. Chest freezer, manual defrost.	6.18 + 0.337V	13.72 + 0.332V
2. Upright freezer, manual defrost.	3.00 + 0.393V	10.85 + 0.342V
3. Upright freezer, automatic defrost.	3.30 + 0.197V	8.07 + 0.093V

V = Total unadjusted volume, expressed in ft.³

(c) *Dishwashers.*
[Reserved]

(d) *Clothes Dryers.*

Product class	July 15, 1981	January 1, 1986
1. Electric, standard size	2.96 – 0.048V	3.31 – 0.048V
2. Electric, compact size, 120 Volts.	2.63	2.85
3. Electric, compact size, 240 Volts.	2.35	2.54
4. Gas	2.71 – 0.048V	2.91 – 0.048V

V = Drum volume, expressed in ft.³

(e) *Water heaters.*

Product class	July 15, 1981	January 1, 1986
1. Electric	0.860 – 0.001EV	0.996 – 0.013V
2. Gas	0.546 – 0.001EV	0.653 – 0.000625V
3. Oil	No Standard.	No Standard.

V = Storage volume, expressed in gallons.

(f) *Room air conditioners.*

Product class	July 15, 1981	January 1, 1986
1. With outdoor side louvers; capacity of 6,000 Btu/hr or less.	6.5	8.4
2. With outdoor side louvers; capacity greater than 6,000 Btu/hr but less than 20,000 Btu/hr.	7.5	9.5
3. Without outdoor side louvers; capacity of 20,000 Btu/hr or greater.	6.7	8.4
4. With outdoor side louvers; or reverse cycle.	6.7	9.0

(g) *Home heating equipment not including furnances.*
[Reserved]

(h) *Television sets.*
[Reserved]

(i) *Kitchen ranges and ovens.*

Product class	July 15, 1981	January 1, 1986
1. Microwave oven	No standard.	No standard.
2. Electric cooking top	No standard.	No standard.
3. Electric oven	17.6 – 1.57V	20.2 – 1.57V
4. Electric oven, self-cleaning	17.6 – 1.57V	18.3 – 1.57V
5. Gas cooking top	31	45
6. Gas oven	6.4 – 0.73V	9.2 – 0.73V
7. Gas oven, self-cleaning	7.2 – 0.73V	8.6 – 0.73V

V=Total oven volume, expressed in ft³.

(j) *Clothes washers.*
[Reserved]

(k) *Humidifiers.*
[Reserved]

(l) *Dehumidifiers.*
[Reserved]

(m) *Central air conditioners.*

Product class	July 15, 1981	January 1, 1986
1. Split system—cooling only	7.8	11.0
2. Single package—cooling only.	7.5	10.5
3. Air source, split system, heat pump.	Space reserved.	
4. Air source, single package, heat pump.	Space reserved.	
5. Air source, split system, heating only heat pump.	Space reserved.	

(n) *Furnaces.*

Product class	July 15, 1981	January 1, 1986
1. Electric	No standard.	No standard.
2. Gas gravity	No standard.	No standard.
3. Gas, forced air, indoor	65	81
4. Gas, forced air, outdoor, nonweatherproof horizontal.	56	74
5. Gas, forced air, outdoor, other than nonweatherproof.	68	76
6. Gas boiler, indoor	65	79
7. Gas boiler, outdoor	No standard.	No standard.
8. Oil, forced air, indoor	75	80
9. Oil, forced air, outdoor	71	78
10. Oil boiler, indoor	76	82
11. Oil boiler, outdoor	No standard.	No standard.

4. Subpart D of Part 430 is revised to read as follows:

Subpart D—Petitions To Supersede State Regulation; Petition To Exempt State Regulation From Supersession

Sec.
430.40 Scope and purpose.
430.41 Prescriptions of a rule.
430.42 General filing requirements.
430.43 Filing of petitions.
430.44 Notice of petition.
430.45 Consolidation.
430.46 Hearing.
430.47 Disposition of petitions.
430.48 Request for reconsideration.
430.49 Finality of decision.

Subpart D—Petitions To Supersede State Regulation; Petitions To Exempt State Regulation From Supersession

Authority: Sec. 327(b), Energy Policy and Conservation Act, as amended by Pub. L. 95–619 (42 U.S.C. 6297(b)).

§ 430.40 Scope and purpose.

(a) The regulations in this subpart prescribe the policy and procedures to be followed in connection with petitions for prescription of a rule to supersede in whole or part a State regulation prescribing an energy efficiency standard or other requirement respecting energy use or energy efficiency of a type (or class) of covered products.

(b) The regulations in this subpart also prescribe the policy and procedures to be followed in connection with petitions for prescription of a rule that a State regulation prescribing an energy efficiency standard or other requirement respecting energy use or energy efficiency of a type (or class) of covered products not be superseded.

§ 430.41 Prescriptions of a rule.

(a) *Criteria for supersession.* Upon petition by any person subject to a State regulation prescribing an energy efficiency standard or other requirement for a type or class of a covered product, the Secretary may prescribe a rule superseding in whole or in part such regulation if he determines that there is no significant State or local interest sufficient to justify such State regulation and such State regulation unduly burdens interstate commerce.

(1) *Requirements of petition to supersede.* A petition to supersede a State regulation shall include the information prescribed in subparagraphs (i) through (xix) below and shall be available for public review, except for confidential or proprietary information submitted in accordance with the Department of Energy's Freedom of Information Regulations set forth in 10 CFR Part 1004:

(i) The name, address and telephone number of the petitioner;

(ii) A statement of the interest of the petitioner for which a superseding rule is sought;

(iii) A copy of the State regulation to which a superseding rule is sought;

(iv) Specification of each type or class of covered product for which a superseding rule is sought;

(v) An enumeration (or estimation) of the total number of covered products sold in the State for which a rule is sought compared to the total national market;

(vi) An enumeration (or estimation) of the number of basic models of the covered product that are above and below the State standard;

(vii) A list of the basic models that will be discontinued with their estimated impact on wholesalers, retailers and consumers, i.e., loss of revenues, loss of jobs, increasing costs, etc., if the State regulation is not superseded;

(viii) An analysis of the effect of complying with State regulations re:

(A) Labor and capital costs;

(B) Material costs;

(C) Transportation costs;

(D) Distribution, inventory and other associated costs; and

(E) Retooling and other modification costs;

(ix) An analysis of the investment capital necessary to comply with the State regulation for:

(A) The largest manufacturer of the product type to which the regulation applies,

(B) An average manufacturer, and

(C) An estimate of the number of manufacturers that cannot meet the capital investment requirments;

(x) An estimate of the number of covered products which would be purchased in the State for each of the next ten years from the date of the petition;

(xi) An estimate of the total energy demand in the State compared to the total national demand for each of the next ten years from the date of the petition;

(xii) An estimate of the total energy usage in the State of the covered product for each of the next ten years from the date of the petition;

(xiii) An estimate of:

(A) The aggregate, and

(B) The peak load amount of energy saved by a covered product through implementation of the State regulation over the Federal standard for each of the next ten years from the date of the petition.

(xiv) A comparison of the net present value of the energy saved by a covered product through implementation of:

(A) the State regulation, and

(B) the Federal standard to the increase in the retail cost of such covered product;

(xv) An estimate of the number of years of operation of the covered product necessary to recoup the estimated increase in the retail cost of such covered product;

(xvi) An environmental analysis prepared in accordance with the Department of Energy's regulations set forth in 10 CFR Part 208 to the maximum extent feasible and reasonable;

(xvii) An analysis of the usage patterns and the climate areas of the covered product;

(xviii) Other information, if any, believed to be pertinent by the petitioner; and,

(xix) Such other information as the Secretary may require.

(b) *Criteria for exemption from supersession.* Upon petition by a State which has by regulation prescribed an energy efficiency standard or other requirement for a type or class of a covered product for which a Federal energy efficiency standard is applicable the Secretary may prescribe a rule that such regulation not be superseded if he determines that there is a significant State or local interest to justify such State regulation and such State regulation contains a more stringent energy efficiency standard than such Federal standard, except that he may not prescribe such a rule if he finds that such State regulation would unduly burden interstate commerce.

(1) *Requirements of petition for exemption from supersession.* A petition from a State for a rule for exemption from supersession shall include the information prescribed in paragraphs (a)(1) (i) through (vii) and (x) through (xix) of this section. A petition for a rule and correspondence relating to such petition shall be available for public review except for confidential or proprietary information submitted in accordance with the Department of Energy's Freedom of Information Regulations set forth in 10 CFR Part 1004.

(c) All analyses of the effect of a State regulation shall include discussions of the basis of the analyses.

(d) A petition for a rule shall be submitted in triplicate to: The Secretary, U.S. Department of Energy, Section 327 Petitions, Energy Efficiency Standards for Consumer Products, 1000 Independence Avenue, S.W., Washington, D.C. 20585.

§ 430.42 General filing requirements.

(a) *Service.* All documents required to be served under this subpart shall, if mailed, be served by first class mail. Service upon a person's duly authorized representative shall constitute service upon that person.

(b) *Obligation to supply information.* A person or State submitting a petition is under a continuing obligation to provide any new or newly discovered information relevant to that petition. Such information includes, but is not limited to, information regarding any other petition or request for action subsequently submitted by that person or State.

(c) *The same or related matters.* A person or State submitting a petition or other request for action shall state whether to the best knowledge of that petitioner the same or related issue, act, or transaction has been or presently is being considered or investigated by DOE; by any other Federal or State agency, department, or instrumentality; or by a Federal or State court.

(d) *Computation of time.* (1) In computing any period of time prescribed by or allowed under this subpart, the day of the action from which the designated period of time begins to run is not to be included. If the last day of the period is Saturday, or Sunday, or Federal legal holiday, the period runs until the end of the next day that is neither a Saturday, Sunday, nor Federal legal holiday.

(2) Saturdays, Sundays, and intervening Federal legal holidays shall be excluded from the computation of time when the period of time allowed or prescribed is 7 days or less.

(3) When a submission is required to be made within a prescribed time, DOE may grant an extension of time upon good cause shown.

(4) Documents received after regular business hours are deemed to have been submitted on the next regular business day. Regular business hours for the DOE's National Office, Washington, D.C., are 8:30 a.m. to 4:30 p.m.

(5) DOE reserves the right to refuse to accept, and not to consider, untimely submissions.

§ 430.43 Filing of petitions.

(a)(1) A petition for a rule to supersede a State regulation, all supporting documents, and all future submissions shall be served on each State agency, department, or instrumentality whose regulation the petitioner seeks to supersede.

(2) A petition for a rule not to supersede a State standard, all supporting documents, and all future submissions shall be served on each manufacturer of a covered product who will or may be affected by the State law or regulation the petitioner seeks to sustain.

(3) The petition shall contain a certification of this service which states the name and mailing address of the served parties, and the date of service.

(b) A petition may be submitted on behalf of more than one person. A joint petition shall indicate each person participating in the submission. A joint petition shall provide the information required by § 430.41 for each person on whose behalf the petition is submitted.

(c) All petitions shall be signed by the person(s) submitting the petition or by a duly authorized representative. If submitted by a duly authorized representative, the petition shall certify this authorization.

(d) *Acceptance for filing.* (1) Within fifteen (15) days of the receipt of a petition by the Secretary, the Secretary will either accept it for filing or reject it, and the petitioner will be so notified in writing. The Secretary will serve a copy of this notification on each other party served by the petitioner with a copy of the petition. Only such petitions which conform to the requirements of this subpart and which contain sufficient information for the purposes of a substantive decision will be accepted for filing. Petitions which do not so conform will be rejected and an explanation provided to petitioner in writing.

(2) For purposes of the Act and this subpart, a petition is deemed to be filed on the date it is accepted for filing.

(e) *Docket.* A petition accepted for filing will be assigned an appropriate docket designation. Petitioner shall use the docket designation in all subsequent submissions.

§ 430.44 Notice of petition.

(a) Promptly after receipt of a petition and its acceptance for filing, notice of such petition shall be published in the **Federal Register.** The notice shall set forth the availability for public review of all data and information available, and shall solicit comments, data and information with respect to the determination of the petition. Except as may otherwise be specified, the period for public comment shall be 60 days after the notice appears in the **Federal Register.**

(b) In addition to the material required under paragraph (a) of this section, each notice shall contain a summary of the State regulation at issue and either (1) the petitioner's reasons for a rule to supersede the State regulation, or (2) the petitioner's reasons for a rule not to supersede the State regulation.

§ 430.45 Consolidation.

DOE may consolidate any or all matters at issue in two or more proceedings docketed where there exist common parties, common questions of fact and law, and where such consolidation would expedite or simplify consideration of the issues. Consolidation shall not affect the right of any party to raise issues that could have been raised if consolidation had not occurred.

§ 430.46 Hearing.

The Secretary may hold a public hearing, and publish notice in the **Federal Register** of the date and location of the hearing, when he determines that such a hearing is necessary and likely to result in a timely and effective resolution of the issues.

§ 430.47 Disposition of petitions.

(a) As soon as practicable after the submission of public comments under § 430.44(a), the Secretary shall issue a final rule. When practicable, the Secretary shall make his determination within 6 months after the date the petition is filed.

(b) The final rule issued by the Secretary shall include a written statement setting forth his findings and conclusions, and the reasons and basis therefor. A copy of the Secretary's decision shall be sent to either (1) the petitioner, the affected State agency and all persons who submitted comments if the petition is for a rule to supersede a State regulation, or (2) the petitioner, all persons who would be subject to the State regulation if it is not superseded and all persons who submitted comments if the petition is for a rule not to supersede a State regulation. The Secretary shall publish in the **Federal Register** a notice of the final rule granting or denying the petition and the reasons and basis therefor.

(c) If the Secretary finds that he cannot issue a final rule within the 6 month period pursuant to subparagraph (a) of this section, he shall publish a notice in the **Federal Register** extending such period to a date certain, together with the reasons for the delay.

§ 430.48 Request for reconsideration.

(a) Any petitioner whose petition for a rule has been denied may request reconsideration within 30 days of denial. The request shall contain a statement of facts and reasons supporting reconsideration and shall be submitted in writing to the Secretary.

(b) The denial of a petition will be reconsidered only where it is alleged and demonstrated that the denial was based on error in law or fact and that evidence of the error is found in the record of the proceedings.

(c) If the Secretary fails to take action on the request for reconsideration within 30 days, the request is deemed denied, and the petitioner may seek such judicial review as may be appropriate and available.

(d) A petitioner has not exhausted his other administrative remedies until a request for reconsideration has been filed and acted upon or deemed denied.

§ 430.49 Finality of decision.

(a) A decision to prescribe a rule superseding a State standard or other requirement is final on the date the rule is issued, i.e., signed by the Secretary. A decision to deny such a petition is final on the day a denial of a request for reconsideration is issued, i.e., signed by the Secretary.

(b) A decision to prescribe a rule that a State energy efficiency standard or other requirement not be superseded is final on the date the rule is issued, i.e., signed by the Secretary. A decision to prescribe such a rule has no effect on other regulations of a covered product of any other State.

5. Part 430 is amended by adding a new Subpart E, to read as follows:

Subpart E—Small Business Exemptions

Sec.

430.50 Purpose and scope.
430.51 Applicability.
430.52 Eligibility.
430.53 Requirements for application.
430.54 Processing of applications.
430.55 Authority.
430.56 Referral to the Attorney General.
430.57 Decision and order.
430.58 Duration of temporary exemption.

Subpart E—Small Business Exemptions

Authority: Sec. 325, Energy Policy and Conservation Act, Pub. L. 94–163, as amended by Pub. L. 95–619 (42 U.S.C. 6295).

§ 430.50 Scope and purpose.

(a) This subpart establishes procedures for the submission and disposition of applications filed by manufacturers of covered consumer products with annual gross revenues that do not exceed $8 million to temporarily exempt them from all or part of the energy efficiency standards established by this part.

(b) The purpose of this subpart is to provide content and format requirements for manufacturers of covered consumer products with low annual gross revenues who desire to apply for temporary exemptions from applicable energy efficiency standards.

§ 430.51 Applicability.

This subpart applies to manufacturers of covered products. Applications filed by manufacturers under this subpart shall be submitted to the Secretary within 60 days from the date the Federal energy efficiency standards are prescribed for which an exemption is sought.

§ 430.52 Eligibility.

Any manufacturer with annual gross revenues that do not exceed $8,000,000 for the preceding 12-month period from all its operations (including the manufacture and sale of covered products) that manufacturers covered products may apply for an exemption. In determining the annual gross revenues of any manufacturer under this subpart, the annual gross revenue of any other person who controls, is controlled by, or is under common control with, such manufacturer shall be taken into account.

§ 430.53 Requirements for application.

(a) Each application filed under this subpart shall be submitted in triplicate to: The Secretary, U.S. Department of Energy, Small Business Exemptions, Energy Efficiency Standards for Consumer Products, 1000 Independence Avenue, S.W., Washington, D.C. 20585.

(b) An application need be in no particular form but it shall be in writing and shall include the following:

(1) Name of applicant (including business name, if different) and mailing address. Address of the affected facility or operation, if different, should also be included;

(2) Whether the applicant controls, is controlled by, or is under common control with another manufacturer, and if so, the nature of that control relationship;

(3) Signature of the owner, partner, or principal executive officer requesting the exemption;

(4) State the text or substance of the standard or portion thereof for which the temporary exemption is sought, and the length of time for such exemption;

(5) Annual financial statements, profit and loss statements, and balance sheets of the applicant and any person who controls, is controlled by, or is under common control with, the applicant for the three years immediately preceding the application for exemption;

(6) Describe the covered consumer product, including the number produced by applicant, and the period of production for which the temporary exemption is sought;

(7) The toal number and dollar volume for each type and class of covered product manufactured by the applicant in the three model years immediately preceding the application for exemption;

(8) Provide evidence that applicant would be at an operational or financing disadvantage with other manufacturers with respect to the planning, design, or installation of equipment, or the obtaining of financing therefor, or likely to suffer such disadvantage, providing to the maximum extent feasible;

(i) Any written information concerning the design capabilities of the covered consumer products, which would bear on applicant's efforts to comply with the applicable standards, including an estimated schedule for the implementation of the design changes to comply with the applicable standards;

(ii) A detailed estimate of the total costs to comply with the applicable standards, listing and identifying each cost to the maximum possible extent;

(iii) A list or description of each item of equipment that would have to be obtained or modified in order to achieve compliance;

(iv) The itemized estimated cost to obtain or modify each item if compliance were to be achieved (A) as soon as possible, (B) at the end of a 1 year exemption period (if the application is for 1 year), (C) at the end of a 2 year exemption period (if the application is for 2 years);

(v) The estimated price increases per unit to comply with the Federal standard and a statement of the anticipated effect of each such price increase;

(vi) A description of applicant's efforts to comply with the standards, including (A) a discussion of alternative means of compliance considered and the reasons for rejection of each, (B) a description of the steps to be taken while the exemption is in effect, and the estimated date by which full compliance will be achieved either by design changes or termination of production of nonconforming units;

(9) A statement whether, at the end of the exemption period, the applicant will be able to comply with the standard;

(10) A discussion of any other hardships (i.e., loss of market shares) that the applicant desires the Secretary to consider;

(11) Evidence that failure to grant an exemption would likely result in a lessening of competition; and

(12) The applicant shall identify all other manufacturers of domestically marketed units of the same or similar product type, and all other persons reasonably ascertainable by the applicant as a person who may be aggrieved by the action sought.

(c) The applicant shall set forth all data, views and arguments supporting the exemption, including the information and data specified, above, and the calculations and analyses used to develop that information and data. No documents may be incorporated by reference in an application unless the documents are submitted with the application.

(d)(1) The application shall specify and segregate any part of the information and data submitted under this subpart that the applicant considers to be confidential;

(2) With respect to information and data requested to be withheld under 10 CFR 1004.11, the application shall show that disclosure of the information and data would result in significant competitive damage, specify the period during which the information and data must be withheld to avoid that damage, and show that earlier disclosure would result in that damage;

(e) The knowing and willful submission of false, fictitious or fraudulent information will subject the applicant to the civil and criminal penalties of 18 U.S.C. 1001.

§ 430.54 Processing of applications.

(a) The applicant shall serve a copy of the application, all supporting documents, and all subsequent submissions, or a copy from which confidential information has been deleted in accordance with § 430.53, to the Secretary to be made available for public review. The applicant shall notify in writing those persons listed in answer to § 430.53(b)(12) above, of the filing of an application for exemption under this subpart and shall include a statement that the recipient may submit comments regarding the application to the Secretary within 60 days of receipt in

triplicate with a copy to the applicant. The application filed with the Secretary shall include certification to the Department of Energy that the applicant has complied with the requirements of this section and shall include the names and addresses of each person to whom a copy of the application was sent and the date such copy was transmitted to each such addressee.

(b) The Secretary shall publish notice of an application for exemption and a brief description of the reasons therefor, in the **Federal Register.** The notice shall set forth the availability for public review of all data and information available, and shall solicit comments, data and information with respect to the determination of the application. Except as may otherwise be specified, the period for public comment shall be 60 days after the notice appears in the **Federal Register.**

(c) The Secretary on his own initiative may convene a hearing if, in his discretion, he considers such hearing will advance his evaluation of the application.

§ 430.55 Authority.

An exemption filed under this subpart shall be granted by the Secretary only after obtaining the written views of the Attorney General and finding that a failure to allow an exemption would likely result in a lessening of competition.

§ 430.56 Referral to the Attorney General.

Notice of the application for exemption under this subpart shall be transmitted to the Attorney General by the Secretary and shall contain (i) a statement of the facts and of the reasons for the exemption, and (ii) copies of all documents submitted.

§ 430.57 Decision and order.

(a) Upon consideration of the application and other relevant information received or obtained, the Secretary shall issue an order granting or denying the application.

(b) The order shall include a written statement setting forth the relevant facts and the legal basis of the order.

(c) The Secretary shall serve a copy of the order upon the applicant, any other person who commented on the application pursuant to § 430.54 or who participated in the proceeding and upon any other person readily identifiable by the Secretary as one who is interested in or aggrieved by such order. The Secretary also shall publish in the **Federal Register** a notice of the grant or denial of the order and the reason therefor.

(d) Unless a later effective date is specified in the notice of the exemption, a temporary exemption is effective upon publication of the notice in the **Federal Register** and exempts covered products manufactured on and after the effective date. The filing of an application for exemption shall not constitute grounds for noncompliance with any requirements of this part, until an exemption has been granted.

§ 430.58 Duration of temporary exemption.

A temporary exemption terminates according to its terms but not later than twenty-four months after prescription of the rule for which the exemption is allowed.

6. Part 430 is amended by adding a new Subpart F, to read as follows:

Subpart F—Certification and Enforcement

Sec.

430.60 Scope and purpose.
430.61 Compliance—standards.
430.62 Certification—general requirements.
430.63 Certification—statement of compliance.
430.64 Distribution in commerce.
430.65 Certification—test sample selection.
430.66 Certification—retention of test units.
430.67 Certification—test unit preparation.
430.68 Cessation of distribution of a basic model.
430.69 Manufacturer responsibility for monitoring compliance.
430.70 Reporting requirements.
430.71 Certification—maintenance of records.
430.72 Enforcement.
430.73 Remedies.
430.74 Rights of entry and inspection.
430.75 Field test exemption.
430.76 Prohibited acts.
430.77 Hearing and appeals.
430.78 Citizen suits.
430.79 Imported products.
430.80 Exported products.
430.81 Subpoena.
430.82 Confidentiality.

Subpart F—Certification and Enforcement

Authority: Secs. 326, 328, 332, and 333, Energy Policy and Conservation Act, Pub. L. 94–163, as amended by Pub. L. 95–619 (42 U.S.C. 6296, 6298, 6302, 6303).

§ 430.60 Scope and purpose.

The regulations in this subpart prescribe the procedures to be followed for certification and enforcement testing to determine whether a basic model of a covered product complies with the applicable energy efficiency standard.

§ 430.61 Compliance—standards.

(a) No basic model of a covered product shall be distributed in commerce in the United States unless it meets the applicable energy efficiency standard set forth in subpart C and the certification and enforcement provisions set forth in this subpart.

(b) *Sampling.* The determination that a manufacturer's basic model complies with the applicable energy efficiency standard shall be based on testing conducted in accordance with the statistical sampling procedures which are set forth in Appendix A of this subpart, the applicable test procedures prescribed in subpart B, and the certification and enforcement provisions set forth in this subpart.

§ 430.62 Certification—general requirements.

(a) Each manufacturer or private labeler before distributing in commerce any basic model of a covered product subject to the applicable energy efficiency standard set forth in section 430.20, shall certify by means of a statement of compliance that each basic model meets the requirements of that standard.

(b) Each basic model of a covered product distributed in commerce which is subject to energy efficiency standards prescribed in subpart C, shall meet all certification requirements described in this subpart.

(c) Any change to a basic model which affects energy consumption may constitute the addition of a new basic model and is subject to the requirements of paragraph (b) of this section. If such change does not alter compliance with the applicable energy efficiency standards for the basic model, the new model shall be considered certified.

(d) Each private labeler is required to submit a statement of compliance, but is not required to conduct sampling and testing in accordance with paragraph (b) of section 430.61. In lieu of conducting such tests he shall submit:

(1) A signed statement from the manufacturer of such covered products that the required sampling in accordance with paragraph (b) of section 430.61 has been conducted and the basic model complies with the applicable energy efficiency standard;

(2) The date of the manufacturer's submitted statement of compliance to DOE; and

(3) The location of the supporting test data.

§ 430.63 Certification—statement of compliance.

(a) *Certification of production units.* For each basic model of a covered product, a manufacturer is required to determine compliance with the applicable energy efficiency standard, based upon testing production units in accordance with section 430.62 and

Appendix A (Sampling Plan Requirement) of this subpart. The manufacturer and each private labeler of such product shall submit a statement of compliance together with a certification report for the basic model. The content and format of the statement of compliance are prescribed in Appendix B of this subpart.

(1) By submitting a statement of compliance for a basic model, a manufacturer or private labeler certifies that:

(i) the basic model complies with the applicable energy efficiency standards;

(ii) all batches (as defined in section 430.2) of the basic model, including all models and all configurations within the basic model, are represented by the test units reported in the certification report and comply with the applicable energy efficiency standards;

(iii) all testing on which the certification report is based was conducted in conformance with the applicable test requirements prescribed in subpart B and all test data is reported in accordance with this subpart;

(iv) all test data obtained for the certification report are included in such report and are true, accurate, and complete representations of such testing;

(v) all other information reported in the certification report is true, accurate, and complete; and

(vi) the manufacturer or private labeler is aware of the penalties associated with violations of the Act and the regulations thereunder and 18 U.S.C. 1001 which prohibits knowingly making false statements to the Federal Government.

(2) A manufacturer or private labeler shall not distribute any basic model of such covered product into commerce prior to submitting a statement of compliance and a certification report for the basic model, unless the manufacturer proceeds in accordance with paragraph (b) of this section.

(b) *Conditional Certification Based on Testing of Nonproduction (Prototype) Units.* For each basic model of a covered product, a manufacturer is allowed to determine initial compliance with the applicable energy efficiency standard based upon testing nonproduction (prototype) units in accordance with the applicable test procedures prescribed in subpart B, the manufacturer and each private labeler of such product shall submit a statement of compliance together with a conditional certification report for the basic model. No statement of compliance shall be submitted if the measured energy efficiency of any unit tested is less than the applicable energy efficiency standard for such basic model. The content and format of the statement of compliance to accompany the conditional certification report are prescribed in Appendix B of this subpart.

(1) By submitting a statement of compliance and conditional certification report for a basic model, a manufacturer or private labeler certifies that:

(i) production units of the basic model shall comply with the applicable energy efficiency standards;

(ii) all batches of the basic model, including all models and all configurations within the basic model, are represented by the test units reported in the conditional certification report and shall comply with applicable energy efficiency standards;

(iii) all testing on which the conditional certification report is based was conducted in conformance with the applicable test procedures prescribed in subpart B and all test data is reported in accordance with this subpart;

(iv) all test data obtained for the conditional certification report are included in such report and are true, accurate and complete representations of such testing;

(v) all other information reported in the conditional certification report is true, accurate and complete;

(vi) the units tested are representative of production units with respect to all energy performance characteristics;

(vii) distribution of the basic model shall continue only upon submittal of a certification report pursuant to the schedule set forth in section 430.64;

(viii) all certification requirements of this subpart shall be completed, and

(ix) the manufacturer or private labeler is aware of the penalties associated with violations of the act and the regulations thereunder and 18 U.S.C. which prohibits knowingly making false statements to the Federal Government.

(2) A manufacturer or private labeler who has filed a statement of compliance and a conditional certification report shall not distribute any basic model of such new covered product into commerce prior to 60 days after such filing. The manufacturer shall certify production units in accordance with Appendix A (Sampling Plan Requirements) of this subpart pursuant to the schedule set forth in section 430.64.

(c) *Recertification.* (1) Except as required by the Secretary, each basic model requires the submittal of only one statement of compliance and certification report. The Secretary may require that a manufacturer submit a new statement of compliance together with a new certification report, based upon new testing in accordance with section 430.62 and Appendix A (Sampling Plan Requirement) of this subpart at any time more than one year from the date of the most recent certification report of the subject basic model. Such request shall be made in writing.

(2) If a new statement of compliance and a new certification report are not received by DOE by the date required in a request for recertification in accordance with paragraph (c), then all units of the affected basic model manufactured after the required date for recertification shall be treated as in noncompliance with this subpart in the same manner as though initial certification of the basic model had never occurred.

§ 430.64 Distribution in commerce.

(a) A manufacturer or private labeler may distribute a basic model of a covered product in commerce as soon as such manufacturer or private labeler has certified that such basic model is in compliance with the applicable DOE energy efficiency standard by filing a statement of compliance together with a certification report for the basic model in accordance with paragraph (a) of section 430.63.

(b) A manufacturer or private labeler who has filed a statement of compliance together with a conditional certification report in accordance with paragraph (b) of section 430.63 may distribute a basic model of a covered product in commerce no sooner than 60 calendar days after such filing.

(c) A manufacturer or private labeler who has filed a statement of compliance with a conditional certification report shall file a statement of compliance with a certification report based upon testing of production units of each basic model for which the conditional certification report was filed within the applicable number of calendar days specified below from the start of production of each basic model;

(1) Furnaces and boilers: 20 days.

(2) Water heaters: 20 days.

(3) Refrigerator/refrigerator-freezers: 55 days.

(4) Kitchen ranges and ovens: 20 days.

(5) Central air conditioners: 40 days.

(6) Clothes dryers: 20 days.

(7) Room air conditioners: 20 days.

(8) Freezers: 55 days.

(d) The allotted number of days in paragraph (c) is based upon the estimated time required to sequentially test for units of each product. DOE may grant an extension of time to complete testing upon a written request from the manufacturer, if supported by evidence that additional time is necessary (e.g., evidence that the testing of more than four units is required).

(e) Failure to submit a certification report for the subject basic model in the allotted number of days prescribed in paragraph (c), or granted under paragraph (d), shall subject the manufacturer to assessment of a civil penalty for a knowing violation for each unit of the basic model distributed in commerce.

§ 430.65 Certification—test sample selection.

(a) In order to select test units for certification testing, in accordance with the statistical sampling procedures set forth in Appendix A of this subpart, the manufacturer shall select a batch of production units. Such batch shall be selected from all production units of a basic model from a manufacturer's production over a period of time no less than two days, or the total period of production for the applicable basic model, whichever is less. The batch may be selected from different production runs or from different production facilities.

(1) Each unit of a basic model in a batch shall have been produced by the manufacturer for distribution in commerce using the manufacturer's normal production process.

(2) A manufacturer shall select a batch sample of no fewer than 20 units from the batch of the basic model by means of a random process in which all units in the batch are sequentially numbered and a random numbers table is used to select the units to be included in the batch sample. The manufacturer shall keep on hand all units in the batch sample until such time as the basic model is determined to be in compliance in accordance with paragraph (a) of section 430.63.

(3) Individual test units comprising the test sample shall be randomly selected from the batch sample. The random selection shall be achieved by sequentially numbering all of the units in a batch sample and then using a table of random numbers to select the units to be tested.

(b) If a manufacturer has tested production units of a basic model to satisfy the test requirements of the Federal Trade Commission "Rule for Using Energy Costs and Consumption Information Used in Labeling and Advertising for Consumer Appliances Under the Energy Policy and Conservation Act," 16 CFR Part 305, then, all such units, in addition to any units selected under this section, shall comprise the first test sample for determining compliance under paragraph (a) of § 430.63. The manufacturer shall report the results of all such tests to DOE with the statement of compliance and certification report for such basic model.

(c) If a manufacturer elects to conduct conditional certification, such manufacturer shall test one or more nonproduction units for compliance in accordance with paragraph (b) of § 430.63 and the applicable energy efficiency standard set forth in § 430.32. A manufacturer who elects to conditionally certify shall select and test production units for determination of compliance in accordance with paragraph (a) of § 430.63.

(d) If a manufacturer has tested nonproduction units of a basic model to satisfy the test requirements of the Federal Trade Commission "Rule for Using Energy Costs and Consumption Information Used in Labeling and Advertising for Consumer Appliances Under the Energy Policy and Conservation Act," 16 CFR Part 305, and production of the basic model has not begun, then the results of all such tests of nonproduction units shall be included in meeting the requirements of paragraph (b) of § 430.63.

§ 430.66 Certification—retention of test units.

(a) The production unit with the highest measured energy efficiency among all the units of the basic model that were tested to certify the manufacturer's compliance with the applicable energy efficiency standard shall be retained in retestable condition by the manufacturer for no less than two years after the basic model has ceased to be produced by the manufacturer.

(b) The manufacturer shall retain in retestable condition all the other production units of the basic model that were tested to certify the manufacturer's compliance with the applicable energy efficiency standard for 30 calendar days after the date of filing with DOE of the statement of compliance and the certification report for the basic model. DOE may notify the manufacturer during this time period to retain all the units in retestable condition for an additional 120 days for further testing. If such testing is required by DOE, the Secretary will notify the manufacturer during the 120 days by means of a test notice in accordance with § 430.72.

(c) If the manufacturer files a conditional certification report on the basis of nonproduction units, the manufacturer shall retain in retestable condition all nonproduction units of the basic model tested to certify the manufacturer's compliance with the applicable energy efficiency standard until the requirements of paragraphs (a) and (b) are met.

§ 430.67 Certification—test unit preparation.

(a) Prior to and during testing, a production test unit selected in accordance with § 430.65 shall not be prepared, modified, or adjusted in any manner unless such preparation, modification, or adjustment is allowed by the applicable DOE test procedure. One test shall be conducted for each test unit in accordance with the applicable test procedures prescribed in subpart B.

(b) No quality control, testing or assembly procedures shall be performed on a production test unit, or any parts and subassemblies thereof, that is not performed during the production and assembly of all other units included in the basic model.

§ 430.68 Cessation of distribution of a basic model.

(a) In the event that a new certification test, required pursuant to section 430.63(b), shows that a basic model is not in compliance with the applicable energy efficiency standard, the manufacturer or private labeler shall:

(1) Immediately cease distribution in commerce of the basic model on the day such noncompliance is determined;

(2) Give immediate written notification of the determination of noncompliance, if the basic model has been previously certified in compliance, to:

(i) DOE, and

(ii) All persons to whom the manufacturer has previously distributed units of the basic model manufactured after the date of the last determination of compliance;

(3) The manufacturer may modify the noncompliant basic model in such manner as to make it comply with the applicable energy efficiency standard. Such modified basic model shall then be treated as a new basic model as provided for in paragraph (b) of section 430.62; except that in addition to satisfying all requirements of this subpart, the manufacturer shall also:

(i) Report as an attachment to the certification report, all test results used in the noncompliance determination and all subsequent product modifications; and

(ii) Maintain records that demonstrate that modifications have been made to all units of the modified basic model distributed in commerce.

(b) If a basic model is found to be in noncompliance with these regulations by reason of failure to be properly certified as required by this subpart, the Secretary may seek, among other things, injuctive action as to such basic model.

(c) If the Secretary determines that a test facility used by a manufacturer for certification testing is not appropriate for conducting the tests required for certification based upon DOE inspection of the test facility and available energy efficiency test data, the Secretary will notify the manufacturer in writing of his determination and the reasons therefor. After such notification, no data derived from the subject test facility shall be acceptable for the purposes of this part and the Secretary may request the manufacturer, with respect to models certified on the basis of testing in said facility, to cease to distribute in commerce all units of such basic models.

(d) The manufacturer may request within 15 calendar days, in writing, that the Secretary reconsider his determination pursuant to paragraph (c) that a test facility is not appropriate for conducting certification tests. The manufacturer's request for reconsideration shall include evidence to support the merits of such reconsideration. Such request may include, but not be limited to, evidence that changes have been made to the test facility and such changes have resolved the reasons for disqualification.

§ 430.69 Manufacturer responsibility for monitoring compliance.

(a) A manufacturer shall continue to monitor the production of covered products after certification to assure continued compliance of each basic model with applicable energy efficiency standards and to assure that no significant differences exist in the efficiency of different batches of each basic model.

(b) If, after a basic model has been certified by a manufacturer to be in compliance with the applicable energy efficiency standard, the manufacturer discovers information that the energy efficiency level of such basic model may be less than the applicable energy efficiency standard, then the manufacturer shall:

(1) Immediately notify DOE that such information has been discovered and provide a description of the information; and

(2) Take all necessary action to determine whether the basic model is in noncompliance, the extent to which such units have been distributed, and to remedy such noncompliance.

(c) If a manufacturer determines a basic model is in noncompliance pursuant to paragraph (b) of this section, such manufacturer shall proceed with the requirements of section 430.68. Failure to comply with the requirements of paragraph (b) of this section may cause a manufacturer to be liable for a "knowing violation," as defined in the Act.

§ 430.70 Reporting requirements.

(a) For each basic model of a covered product to be distributed in commerce, a manufacturer or private labeler shall file by certified mail to: Department of Energy, Consumer Products Efficiency Branch, Certification and Enforcement, Forrestal Building, Mail Stop GH068, 1000 Independence Avenue, S.W., Washington, D.C. 20585.

(1) A pre-certification report,

(2) A certification report,

(3) A conditional certification report (when the initial certification testing is conducted on nonproduction units), and

(4) A quarterly post-certification report, in accordance with the requirements prescribed in this subsection.

(b) *Pre-certification Report.* A pre-certification report shall be filed within 60 calendar days after the date of issuance of this rule for each basic model of a covered product currently being manufactured, and shall include the information and follow the format provided in Appendix C of this subpart. A pre-certification report shall be filed at least 60 calendar days prior to any certification testing for each new basic model manufactured thereafter.

(c) *Certification Report.* A certification report shall be filed for a basic model prior to commercial distribution of that basic model and shall include the information and follow the format provided in Appendix B of this subpart, unless a conditional certification report has been filed. In such case, a certification report shall be filed pursuant to the schedule set forth in section 430.64.

(d) *Conditional Certification Report.* A conditional certification report is required to be filed 60 days prior to distribution of a basic model into commerce, if a manufacturer elects to conduct conditional certification. Such report shall include the information and follow the format provided in Appendix B of this subpart.

(e) *Quarterly Post-certification Report.* A post-certification report shall be filed quarterly for each basic model, commencing three months after the date of the initial certification report. Such post-certification report shall include the information and follow the format provided in Appendix B. Information categories for which there is no data revision shall be marked "No Change." The report shall include, but not be limited to:

(1) Revisions necessary to maintain current information contained in the certification report (e.g., additions to or deletions from the model numbers being manufactured under a given basic model).

(2) A description of any other events that might affect the energy efficiency of the basic model (e.g., modifications in production processes).

(3) The number and summary results of energy efficiency tests using the applicable test procedures prescribed in subpart B and conducted since the last post-certification report.

(4) Production and test schedules for the forthcoming six months.

(f) *Additional Information.* The manufacturer, pursuant to a request made by the Secretary, shall provide DOE within 30 days of such request, verification of, or revision of the information filed in reports required in this section, including, but not be limited to:

(1) Model numbers of models scheduled for production for the time period designated in the request;

(2) Model numbers of models produced during the time period designated in the request; and

(3) Schedules of certification testing.

(g) For a basic model determined to be in noncompliance, a manufacturer or private labeler, pursuant to a request made by the Secretary, shall provide DOE within 30 days of the request, records, reports and other documentation pertaining to the acquisition, ordering, storage, shipment, or sale of such basic model.

§ 430.71 Certification—maintenance of records.

(a) The manufacturer of any covered product subject to any of the standards or procedures prescribed in this part, or any private labeler of any covered product who elects to conduct testing in accordance with paragraph (d) of section 430.62, shall establish, maintain, and retain the following organized and indexed records:

(1) A description of energy efficiency test facilities and a record of the calibration of the instrumentation utilized to conduct the test procedures prescribed in subpart B. This record shall include, as a minimum, the information listed in and follow the format given in Appendix D of this subpart.

(2) A description of all repairs, maintenance, and other servicing performed on energy efficiency test facilities and instrumentation utilized to conduct DOE test procedures for which required information is listed in Appendix D of this subpart, giving: (i) the date and time of the maintenance or service, (ii) the reason for it, (iii) the

person authorizing it, and (iv) the names of the supervisory personnel responsible for the maintenance and service.

(3) A statement of the manufacturer's policy for maintaining calibration of the instrumentation used to conduct DOE test procedures.

(4) The supporting test data associated with tests performed on any test units to satisfy the requirements of this subpart (except tests performed by DOE directly). This record shall include the information listed in and follow the format given in Appendix D of this subpart.

(b) The manufacturer or private labeler of any covered product subject to any of the standards or procedures prescribed in this part shall retain on file a copy of each report filed to DOE pursuant to § 430.70.

(c) All records required to be maintained shall be retained by the manufacturer for a period of two years from the date that production of the applicable model has ceased. Records must be retained on standard sized paper.

§ 430.72 Enforcement.

(a) In order to enforce a manufacturer's compliance with the appliable energy efficiency standard, the Secretary shall conduct testing of covered products under this subpart by means of a test notice addressed to the manufacturer in accordance with the following requirements:

(1) The test notice will be signed by the Secretary or his designee. The test notice will be mailed or delivered by DOE to the plant manager or other responsible official, as designated by the manufacturer.

(2) The test noticed will specify the model or basic model to be selected for testing, the method of selecting the test sample, the time at which testing shall be initiated, the date by which testing is scheduled to be completed and the facility at which testing will be conducted. The test notice may also provide for situations in which the selected basic model is unavailable for testing, and may include alternative basic models.

(b) *Testing laboratory.* The Secretary may require in a test notice that the manufacturer of a covered product shall supply at his expense a reasonable number of units of a basic model specified in such test notice to any testing laboratory designated by the Secretary. The number of units of a basic model specified in a test notice shall not exceed twenty, unless units that are supplied fail to complete the test. Whenever DOE conducts enforcement testing at a designated laboratory in accordance with a test notice issued under this section, the resulting test data shall constitute official test data for that basic model. Such test data will be used by DOE to make a determination of compliance or noncompliance if sufficient number of tests have been conducted to satisfy the requirements of Appendix A of this subpart.

(c) The manufacturer shall ship, within 48 hours, the specified test units of a basic model to the testing laboratory.

(d) *Sampling.* The determination that a manufacturer's basic model complies with the applicable energy efficiency standard shall be based on the procedures set forth in paragraph (b) of section 430.61, except that if the calculations of Appendix A determines a total required sample size greater than twenty, only twenty units shall be tested and the lower confidence limit shall be calculated for the test sample size of twenty, or 90 percent of the applicable energy efficiency standard, whichever is greater.

(e) *Test unit selection.* A DOE inspector shall select a batch, a batch sample, and test units from the batch sample in accordance with the provision of section 430.65 and the conditions specified in the test notice. The batch may be subdivided by DOE utilizing specific criteria (e.g., date of manufacture, component supplier, location of manufacturing facility, or other criteria which may differentiate one unit from another within a basic model). The batch sample will then be randomly selected from one or more subdivided groups within the batch. The manufacturer shall keep on hand all units in the batch sample until such time as the basic model is determined to be in compliance or noncompliance.

(f) *Test unit preparation.* Test units shall be prepared for testing in the same manner as they are prepared for certification testing pursuant to section 430.67.

§ 430.73 Remedies.

If DOE determines that a basic model of a covered product does not comply with an applicable energy efficiency standard:

(a) DOE will notify the manufacturer, private labeler or any other person as required, of this finding and of the Secretary's intent to seek a judicial order restraining further distribution in commerce of such basic model unless the manufacturer, private labeler or any other person as required, delivers to DOE within 15 calendar days a statement, satisfactory to DOE, of the steps he will take to insure that the noncompliant model will no longer be distributed in commerce. DOE will monitor the implementation of such statement.

(b) If the manufacturer, private labeler or any other person as required, fails to stop distribution of the noncompliant model, the Secretary may seek to restrain such violation in accordance with section 334 of the Act.

(c) The Secretary shall determine whether the facts of the case warrant the assessment of civil penalties for knowing violations in accordance with section 333 of the Act.

§ 430.74 Rights of entry, and inspection.

(a) An inspection conducted pursuant to this section may be for any of the following purposes for determining:

(1) Whether energy efficiency tests for certification are being conducted pursuant to the requirements contained in this subpart:

(2) Whether covered products manufactured for distribution in commerce conform to applicable energy efficiency standards; and

(3) Whether required records are being properly maintained.

(b) A DOE inspector may enter, in any manner authorized by law, any facility or site of a manufacturer or private labeler during operating hours:

(1) Where tests, required by this regulation, are conducted or any procedures or activities connected with such tests are or were performed;

(2) Where any test unit is present; and

(3) Where records, reports, other documents or information required to be maintained or provided to the Secretary are located.

(c) Upon entry to any facility or site referred to in paragraph (b), the functions of the DOE inspector shall include, but not be limited to:

(1) Inspection of quality control plans and procedures necessary to the manufacture, assembly, and storage which relate to the testing of covered products;

(2) Inspection of testing procedures or preconditioning of test products, and the selection of test products;

(3) Inspection and making copies of any records, reports, documents, or information required to be maintained or provided to the Secretary under this Part;

(d) Any DOE inspector shall be furnished by those in charge of a facility or site being inspected with such reasonable assistance as may be requested to help them discharge any function listed in this section. A manufacturer or private labeler is required to cause those in charge of a facility or site operated for its benefit to

furnish such reasonable assistance without charge to DOE.

(e) The provisions of this section apply whether the facility or site is owned or controlled by the manufacturer or private labeler or by one who acts for the manufacturer or private labeler.

(f) Failure of the manufacturer or private labeler or their agents to comply with or cooperate with the enforcement or any provision of this section shall be grounds for a finding of product noncompliance by the Secretary.

§ 430.75 Field test exemption.

(a) Any manufacturer or private labeler may request a field test exemption from the applicable energy efficiency standards by demonstrating that a proposed field test program is for the purpose of research, investigations, studies, demonstrations, or training.

(b) Such request shall include:

(1) The number of units involved;

(2) The duration of the field test;

(3) The ownership arrangement with regard to the units involved in the test;

(4) The intended final disposition of the units.

§ 430.76 Prohibited acts.

(a) Each of the following is a prohibited act pursuant to section 332 of the Act:

(1) Failure to permit access to, or copying of records required to be supplied under the Act and this rule or fail to make reports or provide other information required to be supplied under the Act and this rule;

(2) Failure of a manufacturer to supply at his expense a reasonable number of covered products to a test laboratory designated by the Secretary;

(3) Failure of a manufacturer to permit a representative designated by the Secretary to observe any testing required by the Act and this rule and inspect the results of such testing; and

(4) Distribution in commerce by a manufacturer or private labeler of any new covered product which is not in compliance with an applicable energy efficiency standard prescribed under the Act and this rule.

(b) In accordance with section 333 of the Act, any person who knowingly violates any provision of paragraph (a) of this section may be subject to assessment of a civil penalty of $100 for each violation. Each violation of paragraph (a) shall constitute a separate violation with respect to each covered product, and each day of noncompliance shall constitute a separate violation.

§ 430.77 Hearings and appeals.

(a) Before issuing an order assessing a civil penalty against any person under this section, the Secretary shall provide to such person notice of the proposed penalty. Such notice shall inform such person of his opportunity to elect in writing within 30 days after the date of receipt of such notice to have the procedures of paragraph (c) [in lieu of those of paragraph (b)] apply with respect to such assessment.

(b)(1) Unless an election is made within 30 calendar days after receipt of notice under paragraph (a) to have paragraph (c) apply with respect to such penalty, the Secretary shall assess the penalty, by order, after a determination of violation has been made on the record after an opportunity for an agency hearing pursuant to section 554 of Title 5, United States Code, before an administrative law judge appointed under section 3105 of such Title 5. Such assessment order shall include the administrative law judge's findings and the basis for such assessment.

(2) Any person against whom a penalty is assessed under this section may, within 60 calendar days after the date of the order of the Secretary assessing such penalty, institute an action in the United States Court of Appeals for the appropriate judicial circuit for judicial review of such order in accordance with Chapter 7 of Title 5, United States Code. The court shall have jurisdiction to enter a judgment affirming, modifying, or setting aside in whole or in part, the order of the Secretary, or the court may remand the proceeding to the Secretary for such further action as the court may direct.

(c)(1) In the case of any civil penalty with respect to which the procedures of this section have been elected, the Secretary shall promptly assess such penalty, by order, after the date of the receipt of the notice under paragraph (a) of the proposed penalty.

(2) If the civil penalty has not been paid within 60 calendar days after the assessment has been made under paragraph (c)(1), the Secretary shall institute an action in the appropriate District Court of the United States for an order affirming the assessment of the civil penalty. The court shall have authority to review de novo the law and the facts involved, and shall have jurisdiction to enter a judgment enforcing, modifying, and enforcing as so modified, or setting aside in whole or in part, such assessment.

(3) Any election to have this paragraph apply may not be revoked except with the consent of the Secretary.

(d) If any person fails to pay an assessment of a civil penalty after it has become a final and unappealable order under paragraph (b), or after the appropriate District Court has entered final judgment in favor of the Secretary under paragraph (c), the Secretary shall institute an action to recover the amount of such penalty in any appropriate District Court of the United States. In such action, the validity and appropriateness of such final assessment order or judgment shall not be subject to review.

(e)(1) In accordance with the provisions of section 333(d)(5)(A) of the Act and notwithstanding the provisions of Title 28, United States Code, or section 502(c) of the Department of Energy Organization Act, the Secretary shall be represented by the general counsel of the Department of Energy (or any attorney or attorneys within DOE designated by the Secretary) who shall supervise, conduct, and argue any civil litigation to which paragraph (c) of this section applies including any related collection action under paragraph (d) in a court of the United States or in any other court, except the Supreme Court of the United States. However, the Secretary or the general counsel shall consult with the Attorney General concerning such litigation, and the Attorney General shall provide, on request, such assistance in the conduct of such litigation as may be appropriate.

(2) In accordance with the provisions of section 333(d)(5)(B) of the Act, and subject to the provisions of section 502(c) of the Department of Energy Organization Act, the Secretary shall be represented by the Attorney General, or the Solicitor General, as appropriate, in actions under this section, except to the extent provided in paragraph (e)(1).

(3) In accordance with the provisions of section 333(d)(5)(c) of the Act, section 402(d) of the Department of Energy Organization Act shall not apply with respect to the function of the Secretary under this section.

§ 430.78 Citizen suits.

(a) In accordance with the provisions of section 335 of the Act, citizen suits may be maintained as hereinafter set forth.

(b) Except as otherwise provided in paragraph (c), any person may commence a civil action against:

(1) Any manufacturer or private labeler who is alleged to be in violation of any provision of this Part; or

(2) The Department of Energy, where there is an alleged failure of DOE to perform any act or duty under this Part which is not discretionary.

(c) The United States District Courts shall have jurisdiction, without regard to the amount in controversy or the citizenship of the parties, to enforce such provision or rule, or order DOE to perform such act or duty, as the case may be.

(d) No action may be commenced:

(1) Under paragraph (b) (1) prior to 60 days after the date on which the plaintiff has given notice of the violation (i) to the Secretary, and (ii) to any alleged violator of such provision or rule. Upon receipt of the complaint, DOE shall determine whether enforcement testing should be undertaken.

(2) Under paragraph (b) (2) prior to 60 days after the date on which the plaintiff has given notice of such action to the Secretary.

(3) Notice required by this section shall be in writing specifying the alleged violation. Notice shall be given to the Secretary and to any alleged violator.

(e) In such action under this section, the Secretary, if not a party, may intervene as a matter of right.

(f) The court, in issuing any final order in any action brought pursuant to paragraph (b) of this section, may award costs of litigation (including reasonable attorney and expert witness fees) to any party, whenever the court determines such award is appropriate.

(g) Nothing in this section shall restrict any right which any person (or class of persons) may have under any statute or common law to seek enforcement of this regulation or to seek any other relief (including relief against the Secretary).

§ 430.79 Imported products.

Pursuant to the provisions of section 331 of the Act:

(a) Any person importing any covered product into the United States shall comply with the provisions of the Act and of this Part; and

(b) Any covered product offered for importation in violation of the act and of this Part shall be refused admission into the customs territory of the United States under rules issued by the Secretary of the Treasury, except that the Secretary of the Treasury may, by such rules, authorize the importation of such covered product upon such terms and conditions (including the furnishing of a bond) as may appear to him appropriate to ensure that such covered product will not violate the act and this Part, or will be exported or abandoned to the United States.

§ 430.80 Exported products.

(a) A covered product, intended solely for export, shall be labeled or marked "Intended For Export" in an easily visible location on the outside of the container and on the product itself, and shall be exempt from the prohibitions and requirements of the Act and this Part.

(b) Any manufacturer or person subject to the provisions of the Act and this Part with respect to any covered product originally intended for export but distributed in commerce for use in the United States may be excluded from the application of the Act and this Part with respect to such product based on a showing that such manufacturer:

(1) Had no knowledge of such product being distributed in commerce for use in the United States; and

(2) Made reasonable efforts to ensure that such product would not be distributed in commerce for use in the United States. Such reasonable efforts would include proper labeling, investigations, prior dealings, and contract provisions.

§ 430.81 Subpoena.

In accordance with the provisions of section 329(a) of the Act, for purposes of carrying out this Part, the Secretary may sign and issue subpoenas for the attendance and testimony of witnesses and the production of relevant books, records, papers, and other documents, and may administer oaths. Witnesses summoned under the provisions of this section shall be paid the same fees and mileage as are paid to witnesses in the courts of the United States. In case of contumacy by, or refusal to obey a subpoena served, upon any persons subject to this Part, the Secretary may seek an order from the District Court of the United States for any District in which such person is found or resides or transacts business requiring such person to appear and give testimony, or to appear and produce documents. Failure to obey such order is punishable by such court as a contempt thereof.

§ 430.82 Confidentiality.

Pursuant to the provisions of 10 CFR 1004.11, any person submitting information or data which he believes to be confidential and exempt by law from public disclosure should submit one complete copy, and fifteen copies from which the information believed to be confidential has been deleted. In accordance with the procedures established at 10 CFR 1004.11 DOE shall make its own determination with regard to any claim that information submitted be exempt from public disclosure.

[FR Doc. 80-19330 Filed 6-27-80; 8:45 am]

BILLING CODE 6450-01-M

APPENDIX A

SAMPLING PLAN REQUIREMENTS FOR CERTIFICATION AND ENFORCEMENT TESTING

PRIMARY PROCEDURE

Step 1. The first sample size (n_1) must be four or more units.

Step 2. Compute the mean ($\bar{x}_1$) of the measured energy efficiencies of the n_1 units in the first sample as follows:

$$\bar{x}_1 = \frac{1}{n_1}\left(\sum_{i=1}^{n_1} EE_i\right) \qquad (1)$$

where $\bar{x}_1$ is the sample mean,

n_1 is the number of units in the first sample, and

EE_i is the measured energy efficiency of unit i.

Step 3. Compute the standard deviation (s_1) of the measured energy efficiencies of the n_1 units in the first sample as follows:

$$s_1 = \sqrt{\frac{\sum_{i=1}^{n_1} (EE_i - \bar{x}_1)^2}{n_1 - 1}} \qquad (2)$$

Step 4. Compute the standard error ($s_{\bar{x}_1}$) of the measured energy efficiencies of the n_1 units in the first sample as follows:

$$s_{\bar{x}_1} = \frac{s_1}{\sqrt{n_1}} \qquad (3)$$

Step 5. Compute the upper confidence limit (UCL) and lower confidence limit (LCL) for mean of the first sample using the DOE energy efficiency standard as the true mean and a confidence level of 95 percent (two-tailed test). The upper and lower confidence limits (LCL and UCL) are computed as follows:

$$LCL = EEL - t\, s_{\bar{x}_1} \qquad (4)$$

$$UCL = EEL + t\, s_{\bar{x}_1} \qquad (5)$$

where EEL is the applicable energy efficiency standard, and

t is a statistic based on the confidence level (95%) and sample size. (t-statistic values are given in Table A-5).

Step 6. Compare the mean of the first sample ($\bar{x}_1$) to the upper and lower confidence limits to determine one of the following:

a. If the mean of the first sample is below the lower confidence limit, then the basic model is in noncompliance and testing is at an end.

b. If the mean of the first sample is equal to or greater than the upper confidence limit, then the basic model is in compliance and testing is at an end.

c. If the sample mean is equal to or greater than the lower confidence limit but less than the upper confidence limit, then no determination of compliance or noncompliance can be made and a second sample size is determined.

Step 7. Determine the second sample size (n_2) using the standard deviation (s_1) of the first sample and a tolerance limit equal to plus or minus 5 percent of the energy efficiency level prescribed in the DOE energy efficiency standard applicable to the basic model being sampled. The second sample size must be large enough that the combined first and second samples are of sufficient size to generate a theoretical distribution of sample means whose lower confidence limit (97.5% confidence level) has an expected value not more than 5 percent below the standard.

$$n_2 \geq \left(\frac{t\ s_1}{0.05\ \bar{x}_1}\right)^2 - n_1 \qquad (6)$$

where 0.05 is the DOE-specified tolerance limit stated as a percent of the EEL.

In the inequality (6), the solution values of t and n_2 depend on each other. The procedure followed for finding the minimum value of n_2 that satisfies the inequality is iterative, as follows:

(a) Assume an initial value of n_2.

(b) Using a standard table of t-statistics find the value of t for the combined sample size of n_1 plus the assumed initial value of n_2 and a confidence level of 97.5 percent (one-tailed).

(c) Using the t-value so determined and the known values of $\bar{x}_1$ and s_1 calculate the right side of the inequality.

(d) If the inequality is not satisfied, assume a new initial value of n_2 and repeat the process.

(e) Continue this iterative process until the minimum value of n_2 which satisfies the inequality is determined.

(f) Given the value of n_2, determine one of the following:

1. If the value of n_2 is less than or equal to zero and the mean energy efficiency level of the first sample is equal to or greater than the lower confidence limit or 90 percent of the applicable energy efficiency level, whichever is greater, the basic model is in compliance and testing is at an end.

2. If the value of n_2 is less than or equal to zero and the mean energy efficiency level of the first sample is less than the lower confidence limit or 90 percent of the applicable energy efficiency level, whichever is greater, the basic model is in noncompliance and testing is at an end.

3. If the value of n_2 is greater than zero, then the value of the second sample size is determined to be the integer closest to and equal to or greater than the solution value of n_2 for inequality (6)

Step 8. Compute the mean of the measured energy efficiencies of the n_1 and n_2 units of the combined first and second samples ($\bar{x}_2$) as follows:

$$\bar{x}_2 = \frac{1}{n_1 + n_2} \left(\sum_{i=1}^{n_1 + n_2} EE_i \right) \quad (7)$$

Step 9. Compute the standard deviation (s_2) of the measured energy efficiencies of the n_1 and n_2 units in the combined first and second samples as follows:

$$s_2 = \sqrt{\frac{\sum_{i=1}^{n_1 + n_2} (EE_i - \bar{x}_2)^2}{n_1 + n_2 - 1}} \quad (8)$$

Step 10. Compute the standard error ($s_{\bar{x}_2}$) of the measured energy efficiencies of the n_1 and n_2 units in the combined first and second samples as follows:

$$s_{\bar{x}_2} = \frac{s_2}{\sqrt{n_1 + n_2}} \quad (9)$$

Step 11. Compute the lower confidence limit for the mean of the combined first and second samples using the DOE energy efficiency standard as the true mean and a confidence level of 97.5 percent (one-tailed test).

The lower confidence limit is computed as follows:

$$LCL = EEL - t\, s_{\bar{x}_2} \quad (10)$$

where the t-statistic is selected for the total number of units in the sample and 97.5 percent (one-tailed) confidence level.

Step 12. Compare the combined sample mean to the lower confidence limit to find one of the following:

a. If the mean of the combined sample is less than the lower confidence limit or 90 percent of the applicable energy efficiency level, whichever is greater, the basic model is in noncompliance and testing is at an end.

b. If the mean of the combined sample is equal to or greater than the lower confidence limit or 90 percent of the applicable energy efficiency level, whichever is greater, the basic model is in compliance and testing is at an end.

ALTERNATE PROCEDURE FOR DETERMINATION OF UCL, LCL, AND n_2, IN LIEU OF EQUATIONS (4), (5), (6) and (10).

The alternate procedure gives the values of the upper and lower confidence limits for numbers of units tested and the minimum size of the second sample, in lieu of computing the values with equations (4), (5), (6) and (10) of the primary procedure. The values that are obtained by utilizing the alternate procedure and Tables A-1 through A-4 are substituted for the appropriate equations in the primary method. The appropriate steps of the primary procedure are then continued.

The derivations of the tables used in this "Alternate Procedure" are given in Appendix G of TSD #3, Certification and Enforcement Analysis.

Table A-1 may be used to determine an acceptable value for the UCL in lieu of equation (4) as follows:

(a) Calculate the coefficient of variation of the measured efficiencies for the sample by dividing the standard deviation by the sample mean.

(b) Find the appropriate range of values for the calculated coefficient of variation in Table A-1.

(c) Select the appropriate value on Table A-1 corresponding to the range of coefficients of variation and the first sample size. This value is expressed as the ratio of the UCL to the applicable energy efficiency standard level.

(d) Determine the approximate UCL by multiplying the applicable energy efficiency standard level by the value obtained in (c) above.

If the sample mean is less than the UCL calculated in (d) above, but greater than the UCL calculated by using the table value corresponding to its immediate left, the manufacturer shall use Step 5 of the primary procedure to obtain the UCL.

The LCL may be determined in the same manner using Tables A-2 and A-3. For sample sizes or values of coefficients of variation greater than the values in Tables A-1, A-2 and A-3, the primary procedure shall be used to obtain the UCL and LCL.

Table A-4 may be used to obtain the minimum second sample size as follows:

(a) Calculate the coefficient of variation of the measured efficiencies for the first sample by dividing the standard deviation of the first sample by the first sample mean.

(b) Find the appropriate range of the coefficient of variation in the Table.

(c) Determine the minimum total sample size corresponding to that range of the coefficient of variation.

(d) Subtract the first sample size from the minimum total sample size to determine the minimum second sample size.

TABLE A-1

UPPER CONFIDENCE LIMIT (AS A RATIO OF THE MEAN STANDARD) AFTER TESTING FIRST SAMPLE

Number of Units	Coefficient of Variation									
	0.000-0.019	0.020-0.029	0.030-0.039	0.040-0.049	0.050-0.059	0.060-0.069	0.070-0.079	0.080-0.089	0.090-0.099	0.100-0.149
4	1.016	1.032	1.048	1.064	1.080	1.095	1.111	1.127	1.143	1.159
5	1.012	1.025	1.037	1.050	1.062	1.074	1.087	1.099	1.112	1.124
6	1.010	1.021	1.031	1.042	1.052	1.063	1.073	1.084	1.094	1.105
7	1.009	1.018	1.028	1.037	1.046	1.055	1.065	1.074	1.083	1.092
8	1.008	1.017	1.025	1.033	1.042	1.050	1.059	1.067	1.075	1.084
9	1.008	1.015	1.023	1.031	1.038	1.046	1.054	1.061	1.069	1.077
10	1.007	1.014	1.021	1.029	1.036	1.043	1.050	1.057	1.064	1.072
11	1.007	1.013	1.020	1.027	1.034	1.040	1.047	1.054	1.060	1.067
12	1.006	1.013	1.019	1.025	1.032	1.038	1.044	1.051	1.057	1.064
13	1.006	1.012	1.018	1.024	1.030	1.036	1.042	1.048	1.054	1.060
14	1.006	1.012	1.017	1.023	1.029	1.035	1.040	1.046	1.052	1.058
15	1.006	1.011	1.017	1.022	1.028	1.033	1.039	1.044	1.050	1.055
16	1.005	1.011	1.016	1.021	1.027	1.032	1.037	1.043	1.048	1.053
17	1.005	1.010	1.015	1.021	1.026	1.031	1.036	1.041	1.046	1.051
18	1.005	1.010	1.015	1.020	1.025	1.030	1.035	1.040	1.045	1.050
19	1.005	1.010	1.014	1.019	1.024	1.029	1.034	1.039	1.043	1.048
20	1.005	1.009	1.104	1.019	1.023	1.028	1.033	1.037	1.042	1.047

NOTE: The range of values of coefficient of variation should be read as follows: "greater than" the first value, and "no greater than" the second value.

This table was prepared with a one-tailed confidence level of 97.5 percent, two-tailed confidence level of 95.0 percent, and a tolerance limit of 5.0 percent.

TABLE A-2

LOWER CONFIDENCE LIMIT (AS A RATIO OF THE MEAN STANDARD) AFTER TESTING FIRST SAMPLE BUT BEFORE REQUIRED MINIMUM NUMBER OF UNITS HAVE BEEN SAMPLED

Number of Units	Coefficient of Variation*									
	.001 - .019	0.020 - 0.029	0.030 - 0.039	0.040 - 0.049	0.050 - 0.059	0.060 - 0.069	0.070 - 0.079	0.080 - 0.089	0.090 - 0.099	0.100 - 0.150
4	0.984	0.968	0.952	0.936	0.920	0.905	0.889	0.873	0.857	0.841
5	0.988	0.975	0.963	0.950	0.938	0.926	0.913	0.901	0.888	0.876
6	0.990	0.979	0.969	0.958	0.948	0.937	0.927	0.916	0.906	0.895
7	0.991	0.982	0.972	0.963	0.954	0.945	0.935	0.926	0.917	0.908
8	0.992	0.983	0.975	0.967	0.958	0.950	0.941	0.933	0.925	0.916
9	0.992	0.985	0.977	0.969	0.962	0.954	0.946	0.939	0.931	0.923
10	0.993	0.986	0.979	0.971	0.964	0.957	0.950	0.943	0.936	0.928
11	0.993	0.987	0.980	0.973	0.966	0.960	0.953	0.946	0.940	0.933
12	0.994	0.987	0.981	0.975	0.968	0.962	0.956	0.949	0.943	0.936
13	0.994	0.988	0.982	0.976	0.970	0.964	0.958	0.952	0.946	0.940
14	0.994	0.988	0.983	0.977	0.971	0.965	0.960	0.954	0.948	0.942
15	0.994	0.989	0.983	0.978	0.972	0.967	0.961	0.956	0.950	0.945
16	0.995	0.989	0.984	0.979	0.973	0.968	0.963	0.957	0.952	0.947
17	0.995	0.990	0.985	0.979	0.974	0.969	0.964	0.959	0.954	0.949
18	0.995	0.990	0.985	0.980	0.975	0.970	0.965	0.960	0.955	0.950
19	0.995	0.990	0.986	0.981	0.976	0.971	0.966	0.961	0.957	0.952
20	0.995	0.991	0.986	0.981	0.977	0.972	0.967	0.963	0.958	0.953

*The range of values of coefficient of variation should be read as follows: "no less than" the first value and "less than" the second value.
This table was prepared with a one-tailed confidence level of 97.5 percent, two-tailed confidence level of 95.0 percent and a tolerance limit of 5.0 percent.

TABLE A-3

LOWER CONFIDENCE LIMIT (AS A RATIO OF THE MEAN STANDARD) OR MINIMUM SAMPLE MEAN REQUIRED FOR COMPLIANCE AFTER TESTING THE REQUIRED MINIMUM NUMBER OF UNITS

Number of Test Units ($n_1 + n_2$)	Coefficient of Variation*									
	.001 - .019	0.020 - 0.029	0.030 - 0.039	0.040 - 0.049	0.050 - 0.059	0.060 - 0.069	0.070 - 0.079	0.080 - 0.089	0.090 - 0.099	0.100 - 0.150
4	0.984	0.968	0.952	0.936	0.920	0.905	0.900	0.900	0.900	0.900
5	0.988	0.975	0.963	0.950	0.938	0.926	0.913	0.901	0.900	0.900
6	0.990	0.979	0.969	0.958	0.948	0.937	0.927	0.916	0.906	0.900
7	0.991	0.982	0.972	0.963	0.954	0.945	0.935	0.926	0.917	0.908
8	0.992	0.983	0.975	0.967	0.958	0.950	0.941	0.933	0.925	0.916
9	0.992	0.985	0.977	0.969	0.962	0.954	0.946	0.939	0.931	0.923
10	0.993	0.986	0.979	0.971	0.964	0.957	0.950	0.943	0.936	0.928
11	0.993	0.987	0.980	0.973	0.966	0.960	0.953	0.946	0.940	0.933
12	0.994	0.987	0.981	0.975	0.968	0.962	0.956	0.949	0.943	0.936
13	0.994	0.988	0.982	0.976	0.970	0.964	0.958	0.952	0.946	0.940
14	0.994	0.988	0.983	0.977	0.971	0.965	0.960	0.954	0.948	0.942
15	0.994	0.989	0.983	0.978	0.972	0.967	0.961	0.956	0.950	0.945
16	0.995	0.989	0.984	0.979	0.973	0.968	0.963	0.957	0.952	0.947
17	0.995	0.990	0.985	0.979	0.974	0.969	0.964	0.959	0.954	0.949
18	0.995	0.990	0.985	0.980	0.975	0.970	0.965	0.960	0.955	0.950
19	0.995	0.990	0.986	0.981	0.976	0.971	0.966	0.961	0.957	0.952
20	0.995	0.991	0.986	0.981	0.977	0.972	0.967	0.963	0.958	0.953

* The range of values of coefficient of variation should be read as follows: "no less than" the first value and "less than" the second value.
This table was prepared with a one-tailed confidence level of 97.5 percent, two-tailed confidence level of 95.0 percent and a tolerance limit of 5.0 percent.

TABLE A-4

TOTAL SAMPLE SIZES (N_1+N_2) REQUIRED FOR COMPLIANCE TESTING

COEFFICIENT OF VARIATION GREATER THAN	but NO GREATER THAN	MINIMUM SAMPLE SIZE REQUIRED FOR CERTIFICATION WITH TABLE E-3 VALUES
0.00	0.02	4
0.02	0.03	4
0.03	0.04	5
0.04	0.05	7
0.05	0.06	8
0.06	0.07	10
0.07	0.08	13
0.08	0.09	15
0.09	0.10	18
0.10	0.12*	20

* FOR VALUES GREATER THAN 0.12, USE THE METHOD GIVEN IN THE PRIMARY APPROACH.

TABLE A-5

VALUES OF t-STATISTIC FOR ONE-SIDED 97.5% CONFIDENCE LEVELS AND TWO-SIDED 95% CONFIDENCE LEVELS

Total Number of Units (n_1+n_2)	t-value
2	12.706
3	4.303
4	3.182
5	2.776
6	2.571
7	2.447
8	2.365
9	2.306
10	2.262
11	2.228
12	2.201
13	2.179
14	2.160
15	2.145
16	2.131
17	2.120
18	2.110
19	2.101
20	2.093
22	2.080
24	2.069
26	2.060
28	2.052
30	2.045
36	2.030
41	2.021
46	2.014
51	2.008
56	2.004
61	2.000
71	1.994
81	1.989
91	1.986
101	1.982
∞	1.9600

Source: Paul G. Hoel, Elementary Statistics, John Wiley & Sons, Inc., New York, 1960, Table IV., p. 243.

APPENDIX B: REQUIRED INFORMATION AND FORMAT FOR THE CERTIFICATION REPORT, CONDITIONAL CERTIFICATION REPORT AND POST-CERTIFICATION REPORT

The required information and formats for the certification report, conditional certification report, and post-certification report--including the cover sheet, compliance statement (for certification and conditional certification reports) and body of the reports--are given in this appendix. The body of the reports is different for each product. There are no product-to-product differences in the forms of the other parts of the reports. The products covered in this appendix include:

(1) Furnaces and Boilers.

(2) Water Heaters.

(3) Refrigerators and Refrigerator-freezers.

(4) Kitchen Ranges and Ovens.

(5) Central Air Conditioners.

(6) Clothes Dryers.

(7) Room Air conditioners.

(8) Freezers.

COVER SHEET

(for Manufacturers)

_____
Model No. of Model Tested

PRODUCT: _____

TYPE OF SUBMITTAL (check one)

____ Conditional Certification Report

____ Certification Report

____ Post-Certification Report

Submit by Certified Mail to:
Department of Energy
Consumer Products Efficiency Branch
Forrestal Building
Mail Stop GN095
1000 Independence Avenue, S.W.
Washington, D.C. 20585
Attention: James Smith

NAME and ADDRESS of MANUFACTURER

_____

_____

_____

BASIC MODEL COVERED IN THIS SUBMITTAL

1. _____

Manufactured, Private Labeled or both (Specify and name private labeler, if applicable, providing address below)

1. _____

NAME and ADDRESS of PRIVATE LABELER, (if applicable)

_____

_____

_____

NAMES, ADDRESSES and PHONE NUMBERS OF INDIVIDUAL(S) responsible for:

	a. DOE LIAISON	b. EFFICIENCY TESTING	c. NON-TEST INFORMATION
Name:	_____	_____	_____
address:	_____	_____	_____
	_____	_____	_____
phone no:	_____	_____	_____

Signed _____ Date _____

COVER SHEET

(for Private Labelers) _____
Model No. of Model Tested

PRODUCT: _____

TYPE OF SUBMITTAL (check one)

____ Conditional Certification Report

____ Certification Report

____ Post-Certification Report

Submit by Certified Mail to:
Department of Energy
Consumer Products Efficiency Branch
Forrestal Building
Mail Stop GN095
1000 Independence Avenue, S.W.
Washington, D.C. 20585
Attention: James Smith

NAME and ADDRESS of PRIVATE LABELER

_____

_____

_____

BASIC MODEL COVERED IN THIS SUBMITTAL

1. _____

MANUFACTURER (Specify and provide address below)

1. _____

NAME and ADDRESS of MANUFACTURER

_____

_____

_____

NAMES, ADDRESSES and PHONE NUMBERS OF INDIVIDUAL(S) responsible for:

	a. DOE LIAISON	b. EFFICIENCY TESTING	c. NON-TEST INFORMATION
Name:	_____	_____	_____
address:	_____	_____	_____
	_____	_____	_____
phone no:	_____	_____	_____

Signed _____ Date _____

Compliance Statement to be included in a Certification Report:

_____
Model No. of Model Tested

This report is submitted pursuant to Part 430 (Energy Conservation Program for Consumer Products) of the Energy Policy and Conservation Act (Public Law 94-163), and amendments thereto. The basic model included in this report complies with the applicable energy efficiency standards; and all batches of the basic model, including all models and all configurations within the basic model, are represented by the units reported in this certification report and comply with the applicable energy efficiency standards. All testing for which data are reported in this certification report was conducted in conformance with the applicable test requirements prescribed in Subparts B and F of 10 CFR 430. All test data reported in this report is true, accurate, and complete. The units tested are representative of production units with respect to all energy performance characteristics. All certification requirements of Subpart F of 10 CFR 430 shall be completed, including the submittal of a certification report, pursuant to the schedule set forth in Section 430.64 of 10 CFR 430. I am aware of the penalties contained in Section 333 of the Act and 10 CFR § 430.76 pertaining to violation of Section 332 of the Act (Prohibited Acts) and am also aware of the provisions contained in 18 USC § 1001 with regard to criminal sanctions involving false statements.

_____ _____
Date Individual Responsible for Energy Efficiency Testing

_____ _____
Date Individual Responsible for Non-Test Information

Compliance Statement to be included in a Conditional Certification Report:

_____
Model No. of Model Tested

This report is submitted pursuant to Part 430 (Energy Conservation Program for Consumer Products) of the Energy Policy and Conservation Act (Public Law 94-163), and amendments thereto. The basic model included in this report complies with the applicable energy efficiency standards; and all batches of the basic model, including all models and all configurations within the basic model, are represented by the units reported in this conditional certification report and comply with the applicable energy efficiency standards. All testing for which data are reported in this conditional certification report was conducted in conformance with the applicable test requirements prescribed in Subparts B and F of 10 CFR 430. All test data reported in this conditional report is true, accurate, and complete. The units tested are representative of production units with respect to all energy performance characteristics. All certification requirements of Subpart F of 10 CFR 430 shall be completed, including the submittal of a certification report, pursuant to the schedule set forth in Section 430.64 of 10 CFR 430. I am aware of the penalties contained in Section 333 of the Act and 10 CFR § 430.76 pertaining to violation of Section 332 of the Act (Prohibited Acts) and am also aware of the provisions contained in 18 USC § 1001 with regard to criminal sanctions involving false statements.

_____ _____
Date Individual Responsible for Energy Efficiency Testing

_____ _____
Date Individual Responsible for Non-Test Information

(1) Furnaces
REQUIRED CERTIFICATION REPORT FORM (Sheet 1 of)
(To be used for all Certification, Conditional Certification and Post Certification Reports)

_____
Model No. of Model Tested

_____
Manufacturer

_____
Date of Submittal

NOTE: File one set of forms for each basic model to which a sampling plan applies.

I. MODEL SPECIFIC INFORMATION

A. Basic Model Description

1. Product: Furnaces

2. Product Class (Check One)

_____a. Gas, gravity
_____b. Gas, forced air, indoor
_____c. Gas, forced air, outdoor, non-weatherproof horizontal
_____d. Gas, forced air, outdoor, other than non-weatherproof horizontal
_____e. Gas, boiler, indoor
_____f. Gas, boiler, outdoor
_____g. Oil, forced air, indoor
_____h. Oil, forced air, outdoor, non-weatherproof horizontal
_____i. Oil, forced air, outdoor, other than non-weatherproof horizontal
_____j. Oil, boiler, indoor
_____k. Oil, boiler, outdoor

3. Basic Model information

a. Basic Model "Descriptor" (Model Number of Model Tested)* _____
b. Rated Annual Fuel Utilization Efficiency (AFUE)
1) As determined Using DOE Test Procedures _____
2) As determined for FTC Labeling Program _____
c. Nameplate Input and Rated Capacity
1) Nameplate Input _____
2) Rated Capacity (Q_{out}) _____
d. Heat Exchanger Configuration _____
e. Heat Exchanger Material _____
f. Source of Combustion Air _____
g. Energy - Related Options or other features which affect the measure of efficiency _____
h. Estimated Annual Energy Consumption (as determined for the DOE Test Procedure)
1) Average Annual Fuel Energy Consumption _____
2) Average Annual Auxiliary Electrical Energy Consumption _____
i. Estimated Annual Energy Cost (as determined for the FTC Labeling Program) _____

*Use this designator as cross-reference to all following pages of submittal.

(1) Furnaces
REQUIRED CERTIFICATION REPORT FORM (Sheet 2 of)

Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
A. Basic Model Description (Con't)

4. Model Numbers/Serial Numbers Grouped with this Basic Model

Model Numbers	Starting /Serial Nos.	Brand Name	Carry-over or Replacement**	Replaced Model No.**
1.	/	1.	1.	1.
2.	/	2.	2.	2.
3.	/	3.	3	3
4.	/	4.	4.	4.
5.	/	5.	5.	5.
6.	/	6.	6.	6.

4d. Codes for Serial Numbers to allow determination of Date of Manufacture

_____

_____

_____

_____

**If this is a carry-over or replacement model so indicate, otherwise leave blank.

(1) Furnaces
REQUIRED CERTIFICATION REPORT FORM (Sheet 3 of)

Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
B. Production Information

1. Location of all manufacturing facilities producing this basic model
a. _____ b. _____
_____ _____
_____ _____

2. Production Schedule, by facility

	Facility a.	Facility b.
a. Number of production runs planned for the next 12 months	_____	_____
b. Beginning and end dates for each production run Run 1	_____ to _____	_____ to _____
Run 2	_____ to _____	_____ to _____
Run 3	_____ to _____	_____ to _____
Run 4	_____ to _____	_____ to _____

c. Estimated total annual production for current year
1) less than 200 units _____
2) 200 to 1000 _____
3) more than 1000 _____

3. Critical Component Suppliers (With component type or description)

Item	Supplier(s)	Type or Description
a. Heat Exchanger	_____	_____
b. Burners	_____	_____
c. Electronic ignition device	_____	_____
d. Stack damper	_____	_____
e. Fan/Motor	_____	_____
f. Other distinct energy-related components	_____	_____

C. Test Program Information

1. Location of Test facilities
a. Owned by Company b. Independent Test Laboratory (if used)

_____ _____
_____ _____
_____ _____

2. Percent of Production units to be tested for energy efficiency
a. Using DOE test procedures _____
b. Using other test procedures (specify procedures) _____

D. Other Information (use separate sheet)

(1) Furnaces
REQUIRED CERTIFICATION REPORT FORM (Sheet 4 of)

_____
Model No. of Model Tested

II. SUMMARY OF CERTIFICATION TEST DATA

A. Energy efficiency rating for the Model
1. Model Number of Model Tested _____
2. Rated Annual Fuel Utilization Efficiency (AFUE) _____
3. If this is a replacement model, give model number and rated AFUE of the prior model _____
Model Number/AFUE

B. Description of sample used to obtain ratings
1. Batch Size
2. Type of Units Tested (Check One)
_____a. Production Units
_____b. Other (Describe _____
_____)

C. Location where test units were manufactured

_____
_____
_____

Location where test units were tested

_____
_____
_____

D. Location of underlying test data

_____
_____
_____

E. Summary Test Statistics
1 First Sample
_____a Sample Size
_____b Mean Efficiency
_____c Standard Deviation
_____d Upper Confidence Limit
_____e. Lower Confidence Limit
2 Total Sample (If second sample required
_____a Sample Size
_____b Mean Efficiency
_____c Standard Deviation
_____d Lower Confidence Limit

F Test Results (for each unit tested)

Test Unit	Test Date(s)	Serial No.	Steady State Efficiency	AFUE
1.				
2				
3				
4				
5				
6				

(2) Water Heaters
REQUIRED CERTIFICATION REPORT FORM (Sheet 1 of)
(To be used for all Certification, Conditional Certification and Post Certification Reports)

_____
Model No. of Model Tested

_____
Manufacturer

_____
Date of Submittal

NOTE: File one set of forms for each basic model to which a sampling plan applies.

I MODEL SPECIFIC INFORMATION
A Basic Model Description

1 Product Water Heaters

2 Product Class (Check One)
_____a. Electric
_____b Gas
_____c Oil

3 Basic Model information
a. Basic Model "Descriptor" (Model Number of Model Tested)* _____
b. Rated Energy Factor (EF)
1) As determined Using DOE Test Procedures _____
2) As determined for FTC Labeling Program _____
c. Rated recovery efficiency _____
d. Rated standby loss _____
e Rated first hour rating _____
f Rated Storage Capacity _____
g Rated power input _____
h. Energy Related Options or other features which affect the measure of efficiency _____
_____
_____
i Estimated Annual Energy Consumption (as determined for the FTC Labeling Program) _____
j Estimated Annual Energy Cost (as determined for the FTC Labeling Program) _____

*Use this designator as cross-reference to all following pages of submittal

(2) Water Heaters
REQUIRED CERTIFICATION REPORT FORM (Sheet 2 of)

Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
A. Basic Model Description (Con't)

4. Model Numbers/Serial Numbers Grouped with this Basic Model

Model Numbers	Starting /Serial Nos.	Brand Name	Carry-over or Replacement**	Replaced Model No.**
1.	/	1.	1.	1.
2.	/	2.	2.	2.
3.	/	3.	3.	3.
4.	/	4.	4.	4.
5.	/	5.	5.	5.
6.	/	6.	6.	6.
7.	/	7.	7.	7.
8.	/	8.	8.	8.
9.	/	9.	9.	9.
10.	/	10.	10.	10.
11.	/	11.	11.	11.
12.	/	12.	12.	12.

4d. Codes for Serial Numbers to allow determination of Date of Manufacture

_____

_____

_____

_____

**If this is a carry-over or replacement model so indicate, otherwise leave blank.

(2) Water Heaters
REQUIRED CERTIFICATION REPORT FORM (Sheet 3 of)

Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
B. Production Information

1. Location of all manufacturing facilities producing this basic model
a. _____ b. _____

2. Production Schedule, by facility

		Facility a.	Facility b.
a. Number of production runs planned for the next 12 months			
b. Beginning and end dates for each production run	Run 1	to	to
	Run 2	to	to
	Run 3	to	to
	Run 4	to	to

c. Estimated total annual production for current year
1) less than 200 units _____
2) 200 to 1000 _____
3) more than 1000 _____

3. Critical Component Suppliers (With component type or description)

Item	Supplier(s)	Type or Description
a. Water tank		
b. Heating elements		
c. Main burner		
d. Pilot burner		
e. Thermostatic valve		
f. Flue baffle		
g. Insulating materials		
h. Dip tube/diffuser		
i. Gas pressure regulators		
j. Other distinct energy-related components		

C. Test Program Information

1. Location of Test facilities
a. Owned by Company b. Independent Test Laboratory (if used)

_____ _____

_____ _____

_____ _____

2. Percent of Production units to be tested for energy efficiency
a. Using DOE test procedures _____
b. Using other test procedures (specify procedures) _____

D. Other Information (use separate sheet)

(2) Water Heaters
REQUIRED CERTIFICATION REPORT FORM (Sheet 4 of)

_____
Model No. of Model Tested

II. SUMMARY OF CERTIFICATION TEST DATA

A. Energy efficiency rating for the Model
1. Model Number of Model Tested _____
2. Rated Energy Factor (EF) _____
3. If this is a replacement model, give model number and rated EF of the prior model _____
Model Number/EF

B. Description of sample used to obtain ratings
1. Batch Size
2. Type of Units Tested (Check One)
____a Production Units
____b. Other (Describe _____)

C. Location where test units were manufactured _____

Location where test units were tested _____

D. Location of underlying test data _____

E Summary Test Statistics
1. First Sample
____a. Sample Size
____b Mean Efficiency
____c. Standard Deviation
____d Upper Confidence Limit
____e. Lower Confidence Limit
2. Total Sample (If second sample required)
____a. Sample Size
____b. Mean Efficiency
____c Standard Deviation
____d Lower Confidence Limit

F. Test Results (for each unit tested)

Test Unit	Test Date(s)	Serial No	EF
1			
2			
3			
4			
5			
6			
7			
8			
9			

(3) Refrigerators and Refrigerator-Freezers
REQUIRED CERTIFICATION REPORT FORM (Sheet 1 of)
(To be used for all Certification, Conditional Certification, and Post Certification Reports)

_____
Model No. of Model Tested

_____
Manufacturer

_____
Date of Submittal

NOTE: File one set of forms for each basic model to which a sampling plan applies.

I. MODEL SPECIFIC INFORMATION

A. Basic Model Description

1. Product: Refrigerators and refrigerator - freezers

2. Product Class (Check One)
____a. Electric refrigerator, manual defrost
____b. Electric refrigerator-freezer, manual defrost freezer
____c. Electric refrigerator-freezer, automatic defrost with top freezer
____d. Electric refrigerator-freezer, automatic defrost with side freezer
____e. Electric refrigerator-freezer, automatic defrost with bottom freezer
____f. Electric refrigerator-freezer, automatic defrost with top freezer and through-the-door ice or liquid service
____g. Electric refrigerator-freezer, automatic defrost with side freezer and through-the-door ice or liquid service

3. Basic Model information
a. Basic Model "Descriptor" (Model Number of Model Tested)* _____
b. Rated Energy Factor (EF)
1) As determined Using DOE Test Procedures _____
2) As determined for FTC Labeling Program _____
c. Rated Capacity (cu. ft.)
1) Net refrigerated volume _____
2) Adjusted Total volume _____
d. Electrical Rating - voltage _____
e. Energy - Related Options or other features which affect the measure of efficiency _____
f. Estimated Annual Energy Consumption (as determined for the FTC Labeling Program) _____
g. Estimated Annual Energy Cost (as determined for the FTC Labeling Program) _____

*Use this designator as cross-reference to all following pages of submittal.

(3) Refrigerators and Refrigerator-Freezers
REQUIRED CERTIFICATION REPORT FORM (Sheet 2 of)

_____
Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
A. Basic Model Description (Con't)

4. Model Numbers/Serial Numbers Grouped with this Basic Model

Model Numbers	Starting /Serial Nos.	Brand Name	Carry-over or Replacement**	Replaced Model No.**
1.	/	1.	1.	1.
2.	/	2.	2.	2.
3.	/	3.	3.	3.
4.	/	4.	4.	4.
5.	/	5.	5.	5.
6.	/	6.	6.	6.
7.	/	7.	7.	7.
8.	/	8.	8.	8.
9.	/	9.	9.	9.
10.	/	10.	10.	10.
11.	/	11.	11.	11.
12.	/	12.	12.	12.

4d. Codes for Serial Numbers to allow determination of Date of Manufacture

_____

_____

_____

_____

**If this is a carry-over or replacement model so indicate, otherwise leave blank.

(3) Refrigerators and Refrigerator-Freezers
REQUIRED CERTIFICATION REPORT FORM (Sheet 3 of)

_____
Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
B. Production Information

1. Location of all manufacturing facilities producing this basic model
a. _____ b. _____
_____ _____
_____ _____

2. Production Schedule, by facility

		Facility a.	Facility b.
a. Number of production runs planned for the next 12 months		_____	_____
b. Beginning and end dates for each production run	Run 1	_____ to _____	_____ to _____
	Run 2	_____ to _____	_____ to _____
	Run 3	_____ to _____	_____ to _____
	Run 4	_____ to _____	_____ to _____

c. Estimated total annual production for current year
1) less than 200 units _____
2) 200 to 1000 _____
3) more than 1000 _____

3. Critical Component Suppliers (With component type or description)

Item	Supplier(s)	Type or Description
a. Compressor/Motor	_____	_____
b. Condenser/Coil	_____	_____
c. Condenser fan motor	_____	_____
d. Evaporator	_____	_____
e. Heat exchanger (Interchanger)	_____	_____
f. Door seals	_____	_____
g. Insulating materials	_____	_____
h. Defrost control	_____	_____
i. Refrigerant	_____	_____
j. Anti-sweat heater	_____	_____
k. Other distinct energy-related components	_____	_____

C. Test Program Information
1. Location of Test facilities
a. Owned by Company b. Independent Test Laboratory (if used)
_____ _____
_____ _____
_____ _____

2. Percent of Production units to be tested for energy efficiency
a. Using DOE test procedures _____
b. Using other test procedures (specify procedures) _____

D. Other Information (use separate sheet)

(3) Refrigerators and Refrigerator-Freezers
REQUIRED CERTIFICATION REPORT FORM (Sheet 4 of)

_____
Model No. of Model Tested

II. SUMMARY OF CERTIFICATION TEST DATA

A. Energy efficiency rating for the Model
1. Model Number of Model Tested _____
2. Rated Energy Factor (EF) _____
3. If this is a replacement model, give model number and rated EF of the prior model _____
Model Number/EF

B. Description of sample used to obtain ratings
1. Batch Size
2. Type of Units Tested (Check One)
____a. Production Units
____b. Other (Describe _____)

C. Location where test units were manufactured

_____
_____
_____

Location where test units were tested

_____
_____
_____

D. Location of underlying test data

_____
_____
_____

E. Summary Test Statistics
1. First Sample
____a. Sample Size
____b. Mean Efficiency
____c. Standard Deviation
____d. Upper Confidence Limit
____e. Lower Confidence Limit
2. Total Sample (If second sample required).
____a. Sample Size
____b. Mean Efficiency
____c. Standard Deviation
____d. Lower Confidence Limit

F. Test Results (for each unit tested)

Test Unit	Test Date(s)	Serial No.	EF
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

(4) Kitchen Ranges and Ovens
REQUIRED CERTIFICATION REPORT FORM (Sheet 1 of)
(To be used for all Certification, Conditional Certification and Post Certification Reports)

_____
Model No. of Model Tested

_____
Manufacturer

_____
Date of Submittal

NOTE: File one set of forms for each basic model to which a sampling plan applies.

I. MODEL SPECIFIC INFORMATION

A. Basic Model Description

1. Product: Kitchen ranges and ovens

2. Product Class (Check One)
____a. Microwave oven
____b. Electric cooking top
____c. Electric oven
____d. Electric oven, self cleaning
____e. Gas cooking top
____f. Gas oven
____g. Gas oven, self cleaning

3. Basic Model information
a. Basic Model "Descriptor" (Model Number of Model Tested)* _____
b. Rated Energy Factor (EF)
1) As determined Using DOE Test Procedures _____
c. Capacity (total width, in inches) _____
d. Electric Ratings
1)Amperage ____ 2)Voltage ____ 3)Wattage _____
e. Energy type of each component
f. Design features of oven (conventional or microwave) _____
1) Volume of cooking cavity
2) Ignition type (gas only) _____
3) Forced convection (gas) _____
4) Clock _____
g. Design features of cooking tops
1) Number of cooking surfaces _____
2) Exposed heating elements or burners
3) Smooth _____
4) Electric ignition (gas only) _____
h. Design features of ranges
1) Number of ovens _____
2) For oven portion, fill in f, above
3) For top portion, fill in g, above

*Use this designator as cross-reference to all following pages of submittal.

(4) Kitchen Ranges and Ovens
REQUIRED CERTIFICATION REPORT FORM (Sheet 2 of)

Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
A. Basic Model Description (Con't)

4. Model Numbers/Serial Numbers Grouped with this Basic Model

Model Numbers	Starting /Serial Nos.	Brand Name	Carry-over or Replacement**	Replaced Model No.**
1.	/	1.	1.	1.
2.	/	2.	2.	2.
3.	/	3.	3.	3.
4.	/	4.	4.	4.
5.	/	5.	5.	5.
6.	/	6.	6.	6.
7.	/	7.	7.	7.
8.	/	8.	8.	8.
9.	/	9.	9.	9.
10.	/	10.	10.	10.
11.	/	11.	11.	11.
12.	/	12.	12.	12.

4d. Codes for Serial Numbers to allow determination of Date of Manufacture

_____

_____

_____

_____

**If this is a carry-over or replacement model so indicate, otherwise leave blank.

(4) Kitchen Ranges and Ovens
REQUIRED CERTIFICATION REPORT FORM (Sheet 3 of)

Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
B. Production Information

1. Location of all manufacturing facilities producing this basic model
a. _____ b. _____

2. Production Schedule, by facility

		Facility a.	Facility b.
a. Number of production runs planned for the next 12 months			
b. Beginning and end dates for each production run	Run 1	to	to
	Run 2	to	to
	Run 3	to	to
	Run 4	to	to

c. Estimated total annual production for current year
1) less than 200 units _____
2) 200 to 1000 _____
3) more than 1000 _____

3. Critical Component Suppliers (With component type or description)

Item	Supplier(s)	Type or Description
a. Heating Elements		
b. Control Systems		
c. Microwave Generator		
d. Automatic Ignition		
e. Timers		
f. Thermostats		
g. Insulation		
h. Other distinct energy-related components		

C. Test Program Information

1. Location of Test facilities
a. Owned by Company _____
b. Independent Test Laboratory (if used) _____

2. Percent of Production units to be tested for energy efficiency
a. Using DOE test procedures _____
b. Using other test procedures (specify procedures) _____

D. Other Information (use separate sheet)

(4) Kitchen Ranges and Ovens
REQUIRED CERTIFICATION REPORT FORM (Sheet 4 of)

_____
Model No. of Model Tested

II. SUMMARY OF CERTIFICATION TEST DATA

A. Energy efficiency rating for the Model
1. Model Number of Model Tested _____
2. Rated Energy Factor (EF) _____
3. If this is a replacement model, give model number and rated EF of the prior model _____
Model Number/EF

B. Description of sample used to obtain ratings
1. Batch Size
2. Type of Units Tested (Check One)
____a. Production Units
____b. Other (Describe _____)

C. Location where test units were manufactured

_____
_____
_____

Location where test units were tested

_____
_____
_____

D. Location of underlying test data

_____
_____
_____

E. Summary Test Statistics
1. First Sample
____a. Sample Size
____b. Mean Efficiency
____c. Standard Deviation
____d. Upper Confidence Limit
____e. Lower Confidence Limit
2. Total Sample (If second sample required)
____a. Sample Size
____b. Mean Efficiency
____c. Standard Deviation
____d. Lower Confidence Limit

F. Test Results (for each unit tested)

Test Unit	Test Date(s)	Serial No	EF
1.			
2.			
3.			
4.			
5.			
6.			
7			
8			
9			

(5) Central Air Conditioners
REQUIRED CERTIFICATION REPORT FORM (Sheet 1 of)
(To be used for all Certification, Conditional Certification and Post Certification Reports)

_____
Model No. of Model Tested

_____
Manufacturer

_____
Date of Submittal

NOTE: File one set of forms for each basic model to which a sampling plan applies.

I. MODEL SPECIFIC INFORMATION

A. Basic Model Description

1. Product: Central Air Conditioners

2. Product Class (Check One)
____a. Split system-cooling only
____b. Single package-cooling only
____c. Air source, Split system, heat pump
____d. Air source, Single package, heat pump
____e. Air source, Split system, heating only heat pump

3. Basic Model information
a. Basic Model "Descriptor" (Model Number of Model Tested)* _____
b. Rated Seasonal Energy Efficiency Ratio (SEER)
1) As determined Using DOE Test Procedures _____
2) As determined for FTC Labeling Program _____
c. Cooling Capacity (BTU/hr) _____
d. Electrical Ratings
1) Amperage____ 2) Voltage ____ 3) Wattage _____
e. Condenser Fan Speed(s) _____
f. Inside Air Moving Fan Speed(s) _____
g. Type of Unit (per DOE Test Procedure) _____
h. Energy Related Options or other features which affect the measure of efficiency _____
i. Estimated Annual Operating Cost _____

*Use this designator as cross-reference to all following pages of submittal.

(5) Central Air Conditioners
REQUIRED CERTIFICATION REPORT FORM (Sheet 2 of)

_____
Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
A. Basic Model Description (Con't)

4. Model Numbers/Serial Numbers Grouped with this Basic Model

Model Numbers	Starting /Serial Nos.	Brand Name	Carry-over or Replacement**	Replaced Model No.**
1.	/	1.	1.	1.
2.	/	2.	2.	2.
3.	/	3.	3.	3.
4.	/	4.	4.	4.
5.	/	5.	5.	5.
6.	/	6.	6.	6.
7.	/	7.	7.	7.
8.	/	8.	8.	8.
9.	/	9.	9.	9.
10.	/	10.	10.	10.
11.	/	11.	11.	11.
12.	/	12.	12.	12.

4d. Codes for Serial Numbers to allow determination of Date of Manufacture

_____

_____

_____

_____

**If this is a carry-over or replacement model so indicate, otherwise leave blank.

(5) Central Air Conditioners
REQUIRED CERTIFICATION REPORT FORM (Sheet 3 of)

_____
Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
B. Production Information

1. Location of all manufacturing facilities producing this basic model
a. _____ b. _____
_____ _____
_____ _____

2. Production Schedule, by facility

		Facility a.	Facility b.
a. Number of production runs planned for the next 12 months		_____	_____
b. Beginning and end dates for each production run	Run 1	_____ to _____	_____ to _____
	Run 2	_____ to _____	_____ to _____
	Run 3	_____ to _____	_____ to _____
	Run 4	_____ to _____	_____ to _____

c. Estimated total annual production for current year
1) less than 200 units _____
2) 200 to 1000 _____
3) more than 1000 _____

3. Critical Component Suppliers (With component type or description)

Item	Supplier(s)	Type or Description
a. Compressor(s)	_____	_____
b. Compressor motor	_____	_____
c. Condenser Coil	_____	_____
d. Condenser fan/motor unit	_____	_____
e. Evaporator Coil	_____	_____
f. Evaporator fan/motor unit	_____	_____
g. Refrigerant	_____	_____
h. Other distinct energy-related components	_____	_____

C. Test Program Information

1. Location of Test facilities
a. Owned by Company b. Independent Test Laboratory (if used)
_____ _____
_____ _____
_____ _____

2. Percent of Production units to be tested for energy efficiency
a. Using DOE test procedures _____
b. Using other test procedures (specify procedures) _____

D. Other Information (use separate sheet)

(5) Central Air Conditioners
REQUIRED CERTIFICATION REPORT FORM (Sheet 4 of)

Model No. of Model Tested

II. SUMMARY OF CERTIFICATION TEST DATA

A. Energy efficiency rating for the Model
1. Model Number of Model Tested _____
2. Rated Seasonal Energy Efficiency Ratio (SEER) _____
3. If this is a replacement model, give model number and rated SEER of the prior model _____ Model Number/SEER

B. Description of sample used to obtain ratings
1. Batch Size
2. Type of Units Tested (Check One)
____a. Production Units
____b. Other (Describe _____)

C. Location where test units were manufactured _____ _____ _____

Location where test units were tested _____ _____ _____

D. Location of underlying test data _____ _____ _____

E Summary Test Statistics
1. First Sample
____a. Sample Size
____b Mean Efficiency
____c. Standard Deviation
____d. Upper Confidence Limit
____e. Lower Confidence Limit
2 Total Sample (If second sample required
____a Sample Size
____b Mean Efficiency
____c Standard Deviation
____d Lower Confidence Limit

F. Test Results (for each unit tested.

Test Unit	Test Date(s)	Serial No	SEER
1			
2.			
3			
4.			
5			
6			
7			
8			
9.			

(6) Clothes Dryers
REQUIRED CERTIFICATION REPORT FORM (Sheet 1 of)
(To be used for all Certification, Conditional Certification and Post Certification Reports)

Model No. of Model Tested

Manufacturer

Date of Submittal

NOTE: File one set of forms for each basic model to which a sampling plan applies.

I. MODEL SPECIFIC INFORMATION

A. Basic Model Description

1. Product: Clothes Dryers

2 Product Class (Check One)
____a. Electric, Standard Size
____b. Electric, Compact
____c Gas

3 Basic Model information
a Basic Model "Descriptor" (Model Number of Model Tested)* _____
b Rated Energy Factor (EF)
1) As determined Using DOE Test Procedures _____
c. Rated Drum Capacity (cu. ft.) _____
d. Power Rating of heater (electric only) _____
e Control System
1) Time-Controlled, Manual _____
2) Temperature-Controlled, Automatic Termination _____
3) Moisture Sensor Controlled _____
4) Other _____
f Pilot Light (yes/no) _____

g. Energy Related Options or other features which affect the measure of efficiency _____

*Use this designator as cross-reference to all following pages of submittal.

(6) Clothes Dryers
REQUIRED CERTIFICATION REPORT FORM (Sheet 2 of)

_____
Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
A. Basic Model Description (Con't)

4. Model Numbers/Serial Numbers Grouped with this Basic Model

Model Numbers	Starting /Serial Nos.	Brand Name	Carry-over or Replacement**	Replaced Model No.**
1.	/	1.	1.	1.
2.	/	2.	2.	2.
3.	/	3.	3.	3.
4.	/	4.	4.	4.
5.	/	5.	5.	5.
6.	/	6.	6.	6.
7.	/	7.	7.	7.
8.	/	8.	8.	8.
9.	/	9.	9.	9.
10.	/	10.	10.	10.
11.	/	11.	11.	11.
12.	/	12.	12.	12.

4d. Codes for Serial Numbers to allow determination of Date of Manufacture

_____

_____

_____

_____

**If this is a carry-over or replacement model so indicate, otherwise leave blank.

(6) Clothes Dryers
REQUIRED CERTIFICATION REPORT FORM (Sheet 3 of)

_____
Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
B. Production Information

1. Location of all manufacturing facilities producing this basic model
a. _____ b. _____
_____ _____
_____ _____

2. Production Schedule, by facility

		Facility a.	Facility b.
a. Number of production runs planned for the next 12 months		_____	_____
b. Beginning and end dates for each production run	Run 1	_____ to _____	_____ to _____
	Run 2	_____ to _____	_____ to _____
	Run 3	_____ to _____	_____ to _____
	Run 4	_____ to _____	_____ to _____

c. Estimated total annual production for current year
1) less than 200 units _____
2) 200 to 1000 _____
3) more than 1000 _____

3. Critical Component Suppliers (With component type or description)

Item	Supplier(s)	Type or Description
a. Heating Element	_____	_____
b. Motor	_____	_____
c. Control System	_____	_____
d. Automatic Termination and Overdry Controls	_____	_____
e. Printed Circuit Boards	_____	_____
f. Other distinct energy-related components	_____	_____

C. Test Program Information
1. Location of Test facilities
a. Owned by Company b. Independent Test Laboratory (if used)
_____ _____
_____ _____
_____ _____

2. Percent of Production units to be tested for energy efficiency
a. Using DOE test procedures _____
b. Using other test procedures (specify procedures) _____

D. Other Information (use separate sheet)

(6) Clothes Dryers
REQUIRED CERTIFICATION REPORT FORM (Sheet 4 of)

_____
Model No. of Model Tested

II. SUMMARY OF CERTIFICATION TEST DATA

A. Energy efficiency rating for the Model
1. Model Number of Model Tested _____
2. Rated Energy Factor (EF) _____
3. If this is a replacement model, give model number and rated EF of the prior model _____
Model Number/EF

B. Description of sample used to obtain ratings
1. Batch Size
2. Type of Units Tested (Check One)
_____a. Production Units
_____b. Other (Describe _____)

C. Location where test units were manufactured _____ _____ _____

Location where test units were tested _____ _____ _____

D. Location of underlying test data _____ _____ _____

E. Summary Test Statistics
1. First Sample
_____a. Sample Size
_____b. Mean Efficiency
_____c. Standard Deviation
_____d. Upper Confidence Limit
_____e. Lower Confidence Limit
2. Total Sample (If second sample required).
_____a. Sample Size
_____b Mean Efficiency
_____c. Standard Deviation
_____d Lower Confidence Limit

F. Test Results (for each unit tested)

Test Unit	Test Date(s)	Serial No	EF
1.			
2.			
3.			
4			
5.			
6.			
7			
8.			
9			

(7) Room Air Conditioners
REQUIRED CERTIFICATION REPORT FORM (Sheet 1 of)
(To be used for all Certification, Conditional Certification and Post Certification Reports)

_____
Model No. of Model Tested
_____
Manufacturer
_____
Date of Submittal

NOTE: File one set of forms for each basic model to which a sampling plan applies.

I. MODEL SPECIFIC INFORMATION

A. Basic Model Description

1. Product: Room Air Conditioners

2. Product Class (Check One)
_____a. With outdoor side louvers, 6000 BTU/hr and under
_____b. With outdoor side louvers, over 6000 BTU/hr and under 20,000 BTU/hr
_____c. With outdoor side louvers, over 20,000 BTU/hr
_____d. Without outdoor side louvers, and Reverse cycle

3. Basic Model information
a. Basic Model "Descriptor" (Model Number of Model Tested)* _____
b. Rated Energy Efficiency Ratio (EER)
1) As determined Using DOE Test Procedures _____
2) As determined for FTC Labeling Program _____
c. Cooling Capacity (BTU/h) _____
d. Electrical Ratings
1) Amperage _____ 2) Voltage _____ 3) Wattage _____
e. Compressor Capacity _____
f. Fan Speed(s) _____
g. Air Flow at max. fan speed
1) Dry Coil _____ 2) Wet Coil _____
h. Energy Related Options or other features which affect the measure of efficiency _____
_____
_____
i. Estimated Annual Energy Consumption (as determined for the FTC Labeling Program) _____
j. Estimated Annual Energy Cost (as determined for the FTC Labeling Program) _____

*Use this designator as cross-reference to all following pages of submittal.

(7) Room Air Conditioners
REQUIRED CERTIFICATION REPORT FORM (Sheet 2 of)
Model No. of Model Tested

1. MODEL SPECIFIC INFORMATION (Con't)
A. Basic Model Description (Con't)

4. Model Numbers/Serial Numbers Grouped with this Basic Model

Model Numbers	Starting /Serial Nos.	Brand Name	Carry-over or Replacement**	Replaced Model No.**
1.	/	1.	1.	1.
2.	/	2.	2.	2.
3.	/	3.	3.	3.
4.	/	4.	4.	4.
5.	/	5.	5.	5.
6.	/	6.	6.	6.
7.	/	7.	7.	7.
8.	/	8.	8.	8.
9.	/	9.	9.	9.
10.	/	10.	10.	10.
11.	/	11.	11.	11.
12.	/	12.	12.	12.

4d. Codes for Serial Numbers to allow determination of Date of Manufacture

_____

_____

_____

_____

**If this is a carry-over or replacement model so indicate, otherwise leave blank.

(7) Room Air Conditioners
REQUIRED CERTIFICATION REPORT FORM (Sheet 3 of)
Model No. of Model Tested

1. MODEL SPECIFIC INFORMATION (Con't)
B. Production Information

1. Location of all manufacturing facilities producing this basic model
a. _____ b. _____

2. Production Schedule, by facility

		Facility a.	Facility b.
a.	Number of production runs planned for the next 12 months	_____	_____
b.	Beginning and end dates for each production run Run 1	_____ to	_____ to
	Run 2	_____ to	_____ to
	Run 3	_____ to	_____ to
	Run 4	_____ to	_____ to

c. Estimated total annual production for current year
1) less than 200 units _____
2) 200 to 1000 _____
3) more than 1000 _____

3. Critical Component Suppliers (With component type or description)

Item	Supplier(s)	Type or Description
a. Compressor/motor	_____	_____
b. Condenser coil	_____	_____
c. Evaporator coil	_____	_____
d. Fan	_____	_____
e. Fan motor	_____	_____
f. Refrigerant	_____	_____
g. Other distinct energy-related components	_____	_____

C. Test Program Information

1. Location of Test facilities
a. Owned by Company _____
b. Independent Test Laboratory (if used) _____

2. Percent of Production units to be tested for energy efficiency
a. Using DOE test procedures _____
b. Using other test procedures (specify procedures) _____

D. Other Information (use separate sheet)

(7) Room Air Conditioners
REQUIRED CERTIFICATION REPORT FORM (Sheet 4 of)

_____
Model No. of Model Tested

II. SUMMARY OF CERTIFICATION TEST DATA

A. Energy efficiency rating for the Model
1. Model Number of Model Tested _____
2. Rated Energy Efficiency Ratio (EER) _____
3. If this is a replacement model, give model number and rated EER of the prior model _____
Model Number/EER

B. Description of sample used to obtain ratings
1. Batch Size
2. Type of Units Tested (Check One)
_____a. Production Units
_____b. Other (Describe _____)

C. Location where test units were manufactured / Location where test units were tested

_____ / _____
_____ / _____
_____ / _____

D. Location of underlying test data

_____
_____
_____

E. Summary Test Statistics
1. First Sample
_____a. Sample Size
_____b. Mean Efficiency
_____c. Standard Deviation
_____d. Upper Confidence Limit
_____e. Lower Confidence Limit
2. Total Sample (If second sample required).
_____a. Sample Size
_____b. Mean Efficiency
_____c. Standard Deviation
_____d. Lower Confidence Limit

F. Test Results (for each unit tested)

Test Unit	Test Date(s)	Serial No.	EER
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			

(8) Freezers
REQUIRED CERTIFICATION REPORT FORM (Sheet 1 of)
(To be used for all Certification, Conditional Certification and Post Certification Reports)

_____
Model No. of Model Tested

_____
Manufacturer

_____
Date of Submittal

NOTE: File one set of forms for each basic model to which a sampling plan applies.

I. MODEL SPECIFIC INFORMATION

A. Basic Model Description

1. Product: Freezers

2. Product Class (Check One)
_____a. Manual defrost - chest cabinet
_____b. Manual defrost - upright cabinet
_____c. Automatic defrost - upright cabinet

3. Basic Model information
a. Basic Model "Descriptor" (Model Number of Model Tested)* _____
b. Rated Energy Factor (EF)
1) As determined Using DOE Test Procedures _____
2) As determined for FTC Labeling Program _____
c. Rated Capacity (cu. ft.)
1) Net refrigerated volume _____
d. Electrical Rating-Voltage _____
e. Energy Related Options or other features which affect the measure of efficiency _____
_____
_____
f. Estimated Annual Energy Consumption (as determined for the FTC Labeling Program) _____
g. Estimated Annual Energy Cost (as determined for the FTC Labeling Program) _____

*Use this designator as cross-reference to all following pages of submittal.

(8) Freezers
REQUIRED CERTIFICATION REPORT FORM (Sheet 2 of)

Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
A. Basic Model Description (Con't)

4. Model Numbers/Serial Numbers Grouped with this Basic Model

Model Numbers	Starting /Serial Nos.	Brand Name	Carry-over or Replacement**	Replaced Model No.**
1.	/	1.	1.	1.
2.	/	2.	2.	2.
3.	/	3.	3.	3.
4.	/	4.	4.	4.
5.	/	5.	5.	5.
6.	/	6.	6.	6.
7.	/	7.	7.	7.
8.	/	8.	8.	8.
9.	/	9.	9.	9.
10.	/	10.	10.	10.
11.	/	11.	11.	11.
12.	/	12.	12.	12.

4d. Codes for Serial Numbers to allow determination of Date of Manufacture

_____

_____

_____

_____

**If this is a carry-over or replacement model so indicate, otherwise leave blank.

(8) Freezers
REQUIRED CERTIFICATION REPORT FORM (Sheet 3 of)

Model No. of Model Tested

I. MODEL SPECIFIC INFORMATION (Con't)
B. Production Information

1. Location of all manufacturing facilities producing this basic model
a. _____ b. _____
_____ _____
_____ _____

2. Production Schedule, by facility

		Facility a.	Facility b.
a. Number of production runs planned for the next 12 months		_____	_____
b. Beginning and end dates for each production run	Run 1	_____ to	_____ to
	Run 2	_____ to	_____ to
	Run 3	_____ to	_____ to
	Run 4	_____ to	_____ to

c. Estimated total annual production for current year
1) less than 200 units _____
2) 200 to 1000 _____
3) more than 1000 _____

3. Critical Component Suppliers (With component type or description)

Item	Supplier(s)	Type or Description
a. Compressor/Motor	_____	_____
b. Condenser/Coil	_____	_____
c. Condenser fan motor	_____	_____
d. Evaporator	_____	_____
e. Heat exchanger (Interchanger)	_____	_____
f. Door seals	_____	_____
g. Insulating materials	_____	_____
h. Defrost control	_____	_____
i. Refrigerant	_____	_____
j. Anti-sweat heater	_____	_____
k. Other distinct energy-related components	_____	_____

C. Test Program Information

1. Location of Test facilities
a. Owned by Company b. Independent Test Laboratory (if used)
_____ _____
_____ _____
_____ _____

2. Percent of Production units to be tested for energy efficiency
a. Using DOE test procedures _____
b. Using other test procedures (specify procedures) _____

D. Other Information (use separate sheet)

(8) Freezers
REQUIRED CERTIFICATION REPORT FORM (Sheet 4 of)

_____
Model No. of Model Tested

II. SUMMARY OF CERTIFICATION TEST DATA

A. Energy efficiency rating for the Model
1. Model Number of Model Tested _____
2. Rated Energy Factor (EF) _____
3. If this is a replacement model, give model number and rated EF of the prior model _____
Model Number/EF

B. Description of sample used to obtain ratings
1. Batch Size
2. Type of Units Tested (Check One)
_____a. Production Units
_____b. Other (Describe _____)

C. Location where test units were manufactured

_____
_____
_____

Location where test units were tested

_____
_____
_____

D Location of underlying test data

_____
_____
_____

E Summary Test Statistics
1. First Sample
_____a. Sample Size
_____b. Mean Efficiency
_____c. Standard Deviation
_____d. Upper Confidence Limit
_____e. Lower Confidence Limit
2. Total Sample (If second sample required).
_____a Sample Size
_____b Mean Efficiency
_____c. Standard Deviation
_____d Lower Confidence Limit

F Test Results (for each unit tested)

Test Unit	Test Date(s)	Serial No.	EF
1.	_____	_____	_____
2.	_____	_____	_____
3	_____	_____	_____
4	_____	_____	_____
5	_____	_____	_____
6	_____	_____	_____
7.	_____	_____	_____
8.	_____	_____	_____
9	_____	_____	_____

APPENDIX C: REQUIRED INFORMATION AND FORMAT FOR THE PRE-CERTIFICATION REPORT

The required information and format for the pre-certification report--including the cover sheet and body of the report--are provided here-in.

PRE-CERTIFICATION COVER SHEET

(for Manufacturers)

PRODUCT: _____

Submit by Certified Mail to:
Department of Energy
Consumer Products Efficiency Branch
Forrestal Building
Mail Stop GN095
1000 Independence Avenue, S.W.
Washington, D.C. 20585
Attention: James Smith

NAME and ADDRESS of MANUFACTURER

_____

_____

_____

BASIC MODEL(S) COVERED IN THIS SUBMITTAL

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

Manufactured, Private Labeled or both (Specify and name private labeler, if applicable, providing address below)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

(for additional models use another page)

NAME and ADDRESS of PRIVATE LABELER(S), (if applicable)

_____

_____

_____

NAMES, ADDRESSES and PHONE NUMBERS OF INDIVIDUAL(S) responsible for:

	a. DOE LIAISON	b. EFFICIENCY TESTING	c. NON-TEST INFORMATION
Name:	_____	_____	_____
address:	_____	_____	_____
	_____	_____	_____
phone no:	_____	_____	_____

Signed _____ Date _____

PRE-CERTIFICATION COVER SHEET

(for Private Labelers)

PRODUCT: _____

Submit by Certified Mail to:
Department of Energy
Consumer Products Efficiency Branch
Forrestal Building
Mail Stop GN095
1000 Independence Avenue, S.W.
Washington, D.C. 20585
Attention: James Smith

NAME and ADDRESS of PRIVATE LABELER

_____

_____

_____

BASIC MODEL(S) COVERED IN THIS SUBMITTAL

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

MANUFACTURER (Specify and provide address below)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

(for additional models use another page)

NAME and ADDRESS of MANUFACTURER(S)

_____

_____

_____

NAMES, ADDRESSES and PHONE NUMBERS OF INDIVIDUAL(S) responsible for:

	a. DOE LIAISON	b. EFFICIENCY TESTING	c. NON-TEST INFORMATION
Name:	_____	_____	_____
address:	_____	_____	_____
	_____	_____	_____
phone no:	_____	_____	_____

Signed _____ Date _____

PRE-CERTIFICATION REPORT

The following information should be completed for each model included in this submittal.

A. Basic Model (Name)	B. Model Numbers/Starting Serial Numbers
1. _____ ( )	1. /
	2. /
	3. /
	o
	o
2. _____ ( )	1. /
	2. /
	o
	o

C. Scheduled Date for Start of Certification Testing

Basic Model #1 _____

Basic Model #2 _____

APPENDIX D: MINIMUM INFORMATION TO BE RETAINED BY THE MANUFACTURER ON ENERGY EFFICIENCY TEST FACILITIES AND INSTRUMENTATION.

The required information and format is listed below, for each of the following products:

(1) Furnaces and Boilers.

(2) Water Heaters.

(3) Refrigerators and Refrigerator-freezers.

(4) Kitchen Ranges and Ovens

(5) Central Air Conditioners

(6) Clothes Dryers

(7) Room Air Conditioners

(8) Freezers

(1) Furnaces _____ Model No. of Model Tested

A. Test Conditions
1 Do room test conditions meet all requirements of DOE Test Procedure _____ Yes or No

If not, list differences _____

B. Instruments*

1. Temperature Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

2. Pressure Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

3. Electrical Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

4. Gas or Oil Flow Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

5. Time Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

6. CO_2 Concentration Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

7. Heating Value Measurement Instruments (if measured)
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

8. Tracer Gas Measurement Instruments (if optional tracer gas method used)
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

*If Instrument Conditions change, note changes and list which test units were tested under each set of conditions.

(2) Water Heaters _____ Model No. of Model Tested

A. Test Conditions
1. Test Room Size _____
2. Exhaust System Set-up _____
3. Source of Gas Supply
   a. Utility Company Supply Line _____
   b. Bottled Gas _____

B. Instruments*

1. Temperature Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

2. Electrical Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

3. Gas Flow Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

4. Gas Heating Value Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

5. Pressure Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

6. Time Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

7. Weighing Scales
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

*If Instrument Conditions change, note changes and list which test units were tested under each set of conditions.

(3) Refrigerators and Refrigerator-Freezers _____
Model No. of Model Tested

A. Test Conditions
1. Do room test conditions meet requirements of ANS B38(ASHRAE 13) _____
Yes or No

If not, list differences _____

2. Do conditions of test unit meet requirements of AHAM Standard HRF-2-ECFT _____
Yes or No

If not, list differences _____

B. Instruments*

1. Temperature Measurement Instruments (Thermometer or Thermocouple)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

2. Ambient Temperature Measurement Instruments (Thermometer)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

3. Electrical Measurement Instruments (Watthour meter or other)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

4. Humidity Measurement (Psychrometric) Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

5. Time Measurement Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

*If Instrument Conditions change, note changes and list which test units were tested under each set of conditions.

(4) Kitchen Ranges and Ovens _____
Model No. of Model Tested

A. Test Conditions
1. Installation
a. Does unit and thermocouple installation meet requirements of DOE Test Procedures for Conventional Ranges, Cooking, Tops and Ovens, Microwave Ovens and Microwave/Conventional Ranges - _____
Yes or No

If not, list differences _____

B. Instruments*

1. Temperature Measurement Instruments (for ovens, surface and test blocks)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

2. Ambient Temperature Measurement Instruments (for room)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

3. Electrical Measurement Instruments (Watthour meter or other)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

4. Gas Measurement Instruments (Positive Displacement and Flow meters)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

5. Heat Measurement Instruments (Calorimeter)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

6. Weight Measurement Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

7. Humidity Measurement (Psychrometric) Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

*If Instrument Conditions change, note changes and list which test units were tested under each set of conditions.

(5) Central Air Conditioners _____ Model No. of Model Tested

A. Test Conditions
1. Room Requirements
   a. Type
   b. Dimensions of each room
   c. Description of Reconditioning Equipment
2. Do conditions of room and test unit meet requirements of DOE Test Procedure _____ Yes or No

   If not, list differences _____

B. Instruments*

1. Temperature Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

2. Pressure Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

3. Electrical Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

4. Air Flow and Static Pressure Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

5. Liquid Flow Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

6. Speed Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

7. Time Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

8. Weight Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

*If Instrument Conditions change, note chnages and list which test units were tested under each set of conditions.

(6, Clothes Dryers _____ Model No. of Model Tested

A Test Conditions
1. Do room and unit test conditions meet requirements of DOE Test Procedures _____ Yes or No

   If not, list differences _____
2. Describe Exhaust System Setup _____
3. Describe Load Arrangement Composition _____
   a. Energy Test Cloth _____
   b. Energy Stuffer Cloth _____
4. Certification
   a. of Gas Heating Value _____
   b. of Test Cloth _____
5. Describe Water Hardness Test _____

B. Instruments*

1. Temperature Measurement Instruments (Air & Water)
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

2. Gas Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

3. Electrical Measurement Instruments (Watthour meter or other)
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

4. Heat Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

5. Pressure Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

6. Moisture Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

7. Weight Measurement Instruments
   a. Description and Model No. _____
   b. Accuracy _____
   c. Date Last Calibrated _____

*If Instrument Conditions change, note changes and list which test units were tested under each set of conditions.

(7) Room Air Conditioners _____ Model No. of Model Tested

A. Test Conditions
1. Room Requirements
a. Type
b. Dimensions of each room
c. Description of Reconditioning Equipment
2. Do conditions of room and test unit meet requirements of DOE Test Procedure _____ Yes or No

If not, list differences _____

B. Instruments*

1. Temperature Measurement Instruments (Thermometer or Thermocouple)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

2. Pressure Measurement Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

3. Electrical Measurement Instruments (watthour meter or other)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

4. Water Flow Measurement Instruments
a. Description and Model No _____
b. Accuracy _____
c. Date Last Calibrated _____

5. Time Measurement Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

6. Weight Measurement Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

*If Instrument Conditions change, note changes and list which test units were tested under each set of conditions.

(8) Freezers _____ Model No. of Model Tested

A. Test Conditions
1. Do room test conditions meet requirements of ANS B38(ASHRAE 13) _____ Yes or No

If not, list differences _____
2. Do conditions of test unit meet requirements of AHAM Standard HRF-2-ECFT _____ Yes or No

If not, list differences _____

B. Instruments*
1. Temperature Measurement Instruments (Thermometer or Thermocouple)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

2. Ambient Temperature Measurement Instruments (Thermometer)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

3. Electrical Measurement Instruments (Watthour meter or other)
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

4. Humidity Measurement (Psychrometric) Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

5. Time Measurement Instruments
a. Description and Model No. _____
b. Accuracy _____
c. Date Last Calibrated _____

*If Instrument Conditions change, note changes and list which test units were tested under each set of conditions

APPENDIX E: LIST OF MINIMUM SUPPORTING CERTIFICATION TEST DATA TO BE RETAINED BY THE MANUFACTURER.

The required information and format is listed below, for each of the following products:

(1) Furnaces and Boilers.

(2) Water Heaters.

(3) Refrigerators and Refrigerator-freezers.

(4) Kitchen Ranges and Ovens.

(5) Central Air Conditioners.

(6) Clothes Dryers.

(7) Room Air conditioners.

(8) Freezers.

(1) Furnaces

_____
Model No. of Model Tested

A. ENERGY CONSUMPTION MEASURES

1. Annual Fuel Utilization Efficiency (AFUE)

$$AFUE = \frac{\text{Heat Output Obtained from the Fossil Fuel Input}}{\text{Energy Content of the Fossil Fuel Input}}$$

B. DATA TO BE RECORDED

1. General

Date of Test _____
Manufacturer _____
Test Unit Model No./Serial No. _____
Test Number _____

2. Test Specific Data

It is recommended that the work sheet (Figure 10 in the FR Test Procedures for Furnaces) be retained for every test run. The work sheet should contain the following data:

SYS# - System number from table 4 of the FR test procedure _____

T_{Fuel} - Type of fuel (oil = 1, gas = 2) _____

HHV - measured higher heating value of test gas, in Btu/lb _____

Q_{IN} - fuel energy input rate at steady-state operation (including any pilot light input), in Btu/hr _____

Q_P - fuel energy input rate to pilot light, in Btu/hr _____

PE - electrical power to power burner, in kW _____

BE - electrical power to circulating air blower or water pump, in kW _____

$X_{CO_2,F}$ - concentration by volume of CO_2 present in dry flue gas, in % _____

$X_{CO_2,S}$ - concentration by volume of CO_2 present in dry stack gas, in % _____

$T_{S,SS,X}$ - measured steady-state stack gas temperature, in °F _____

$T_{F,SS}$ - flue gas temperature at steady-state, in °F _____

$T_{F,ON}$ - on-cycle flue gas temperature while the system is in cyclic operation, in °F _____

$T_{F,OFF}$ - off-period flue gas temperature while the system is in cyclic operation, in °F _____

t_1, t_2, t_3, t_4 - different times at which flue and/or stack gas temperature are measured, in min. _____

T_{RA} - Laboratory room temperature, in °F _____

L_J - jacket loss, in % _____

(1) Furnaces (Continued)

	Model No. of Model Tested
S/F - ratio of stack gas mass flow rate to flue gas mass flow rate at steady-state operation and an average outdoor temperature equal to 42°F (5.6°C)	
D_F - off-cycle draft factor for flue gas flow	
D_S - off-cycle draft factor for stack gas flow	
y - ratio of blower on time to burner on time	
PF - ratio of Q_P to Q_N	
HHV_A - average higher heating value of typical fuel, in Btu/lb	
A/F - mass ratio of stoichiometric air to fuel	
$L_{L,A}$ - average latent heat loss of the test fuel	
C_j - jacket loss factor	
$R_{T,F}$ - ratio of combustion air to stoichiometric air	
$R_{T,S}$ - ratio of combustion air and draft relief air to stoichiometric air	
$L_{S,SS,A}$ - sensible heat loss at steady-state operation, in %	
n_{SS} - steady-state efficiency	
$T_{S,SS}$ - calculated stack gas temperature at steady-state, under typical field condition, in °F	
τ_{ON} - heat-up time constant defined in section 4.2.8, in min	
τ_{OFF} - cool-down time constant defined in section 4.2.10, in min	
$\theta_{F,O,X}$ - temperature difference defined in section 4.2.9	
$\Psi_{F,O,X}$ - Temperature difference defined in section 4.2.11	
$\Psi_{F,\infty,X}$ - temperature difference defined by $(T_{F,OFF}(\infty) - T_{RA})$	
$\Psi S,\infty,X$ - temperature difference defined in section 4.2.12	
$\Psi S,O,X$ - temperature difference defined in section 4.2.13	
C_S, C_S' - on-period and off-period correction factors for outdoor units, units intended for installation in unheated spaces or units equipped with direct vent systems	
$K_{I,OFF}$ - multiplication factor for infiltration loss during off-period	

(1) Furnaces (Continued)

	Model No. of Model Tested
$K_{I,ON}$ - multiplication factor for infiltration loss during on-period	
$K_{S,OFF}$ - multiplication factor for sensible heat loss during off-period	
$K_{S,ON}$ - multiplication factor for sensible heat loss during on-period	
T_{OA} - outdoor temperature °F	
t_{on} - burner on time, min.	
t_{off} - burner off time, min.	
t_{on}/τ_{on} - Ratio of the average burner on-time per cycle to the on-cycle time constant. As defined in 4.2.20	
$toff/\tau_{off}$ - Ratio of the average burner off-time per cycle to the off-cycle time-constant as defined in 4.2.21	
$\theta_{F,O}$ - temperature difference defined in section 4.2.22	
$\Psi_{F,O}$ - temperature difference defined in section 4.2.23	
$\Psi_{F,\infty}$ - temperature difference defined in section 4.2.24	
$\Psi_{S,O}$ - temperature difference defined in section 4.2.25	
F3, F4, F5, F6, } integration factors as defined in F7, F8 section 4.2.26, 4.2.27	
$L_{S,OFF}$ - off-cycle sensible heat loss, in %	
$L_{S,ON}$ - on-cycle sensible heat loss, in %	
$L_{I,OFF}$ - off-cycle infiltration loss, in %	
$L_{I,ON}$ - on-cycle infiltration loss, in %	
n_u - part-load fuel utilization efficiency	
$EFFY_A$ - Annual Fuel Utilization Efficiency (AFUE)	

3. Additional data

If the optional tracer gas technique is used, record:

$T_{F,OFF}^*$ - Flue gas temperature during the off period	
V_t - Flow rate of tracer gas through the furnace	
C_t - Concentration by volume of tracer gas	
T_t - temperature of tracer gas	
P_B^t - Barometric pressure	
D_P - the ratio of on and off flue gas mass flow rate	

If the furnace employs the condensing mode, record:

$T_{F,ON}$ - Calculated average flue temperature during the on period	
C_L - Latent heat loss coefficient	
L_c - Condensate heat loss	

(2) Water Heaters

Model No. of Model Tested

A. ENERGY CONSUMPTION MEASURES

1. Energy Factor (EF) = $\frac{\text{Daily Water Heating Energy Consumption}}{\text{Average Daily Energy Consumption}} \times 3,412$

2. Estimating Annual Operating Cost

B. DATA TO BE RECORDED

1. General
   - Date of Test _____
   - Manufacturer _____
   - Test Unit Model No./Serial No. _____
   - Test Number _____
   - Type of Unit (Gas, Oil, or Electric) _____
   - Tank Storage Capacity _____
   - Voltage, Electrical Supply _____
   - Ambient Temperature: max_____ min_____ ave _____
   - Water Supply Temperature _____
   - Water Supply Pressure _____
   - Gas Supply Pressure[1] _____
   - Gas Regulator Outlet Pressure _____
   - Test Gas Higher Heating Value _____
   - Power Input to Main Burner[2] _____
   - Power Input to any auxiliary electrical system during main burner operation[2] _____
   - Power Input to any auxiliary electrical system when the main burner is not in operation[2] _____
   - Outlet Water Connection Heat Trap Credit Claimed? _____
   - Inlet Water Connection Heat Trap Credit Claimed? _____

2. Recovery Efficiency Test
   - Initial Mean Tank Temperature _____
   - Maximum Mean Tank Temperature after Cutout _____
   - Total Fuel Flow[2] _____
   - Total Electrical Energy Consumption _____

3. Standby Loss Test
   - Initial Mean Tank Temperature _____
   - Total Fuel Flow[1] _____
   - Total Electrical Energy Consumption _____
   - Final Mean Tank Temperature _____
   - Time Duration of Test _____
   - Average Mean Tank Temperature _____
   - Average Ambient Air Temperature _____

(2) Water Heaters (Continued)

Model No. of Model Tested

4. First Hour Rating Test[3]
   - Initial Mean Tank Temperature _____
   - Initial Outlet Water Temperature _____
   - Elapsed Time of Test prior to a thermostat acting to operate a heating element or the main burner _____
   - Weight of Water Withdrawn _____
   - Volume of Water Withdrawn _____
   - Mean of the Outlet Water Temperature Readings Recorded _____

[1]gas water heaters only
[2]gas and oil water heaters only
[3]Not applicable if first hour rating was determined by calculation

(3) Refrigerator and Refrigerator-Freezers _____
Model No. of Model Tested

A. ENERGY FACTOR (EF) FORMULA

$$EF = \frac{\text{Adjusted Total Volume } (ft^3)}{\text{Average per cycle energy consumption (kw.hr./cycle)}}$$

Where energy consumption is calculated for a standard cycle. If the unit has an anti-sweat switch which is not set at the highest energy consuming position at the factory then the denominator becomes:

½(Average per cycle energy consumption with switch at highest energy consuming position + Average per cycle energy consumption with switch in position set at factory)

B. DATA TO BE RECORDED

Date of test _____
Manufacturer _____
Test Unit Model No./Serial No. _____
Test Number _____
Test Run _____
Type of Unit _____
Type of Defrost System _____
Total Refrigerated Volume _____
Net Fresh Food (General) Refrigerated Volume (cu.ft.)[4] _____
Net Freezer Refrigerated Volume (cu.ft.)[4] _____
Adjusted Total Refrigerated Volume _____
Number of Temperature Controls _____
Anti-Sweat Heater Switch Setting _____
Power Input (kwh/cycle) _____
Voltage Applied to Unit _____
Frequency _____
Run-in Period (hours) _____
Relative Humidity _____
Ambient Temperature: Max._____, min._____, avg. _____
Average Fresh Food Compartment Temperature (total test)[1] _____
Average Freezer Compartment Temperature (total test)[1] _____
Temp. Control(s) at warmest position _____
Temp. Control(s) at coldest position _____
Temp. Control at mid position[2] _____
Primary Control Warmest, Secondary Coldest[3] _____
Primary Control Coldest, Secondary Warmest[3] _____
Time of Test Period (total test) _____
Time of Testing at each Temp. Control Position _____
Number of cycles of compressor during total test period _____
Number of cycles of compressor at each Temp Control position _____

(3) Refrigerator and Refrigerator-Freezers _____
Model No. of Model Tested

Energy Consumption (total test) _____
Temp. Control(s) at Warmest Position _____
Temp. Control(s) at Coldest Position _____
Temp. Control at Mid Position _____
Primary Control Warmest, Secondary Coldest[3] _____
Primary Control Coldest, Secondary Warmest[3] _____

1-For all average compartment temperatures keep information on all thermocouple locations and readings
2-Single Control Only
3-Multiple Control Only
4-Keep information on all sectional areas and volumes included in measurement

(4) Kitchen Ranges and Ovens

Model No. of Model Tested _____

A. ENERGY CONSUMPTION MEASURES

1. Energy Factor (EF) = $\frac{\text{Annual Useful Cooking Energy Output}}{\text{Total Annual Energy Input}}$
2. Estimated Annual Operating Cost
3. Cooking Efficiency

B. DATA TO BE RECORDED

1. General
   - Date of Test _____
   - Manufacturer _____
   - Test Unit Model No/Serial No. _____
   - Test Number _____
   - Energy Supply, (electric, gas, or propane) _____
   - Ambient Room Air Temperature _____
   - Test Room Temperature at Start of Test _____
   - Test Room Temperature at End of Test _____
   - Test Beaker Water Load Temperature, if required _____
   - Test Block Weight (for each block) _____
   - Initial Temperature of the Test Block under test _____
   - Voltage Input _____
   - Frequency _____
   - Current _____
   - Power Input _____
   - Heating Value for Natural Gas Supply (describe how value determined)[1] _____
   - Heating Value for Propane Gas Supply (describe how value determined)[1] _____
   - Gas Pressure at Inlet[1] _____
   - Regulator Outlet Pressure[1] _____

2. Conventional Ovens Test Energy Consumption
   - Energy Consumed during the time it took the temperature of the test block to rise 234°F.[2] _____
   - Block Temperature at the end of last 'ON' period before block reaches T_o. _____
   - Energy Consumed at the end of last 'ON' period before block reaches T_o[2] _____
   - Block Temperature at the beginning of the next 'ON' period _____
   - Energy Consumed at the beginning of the next 'ON' period[2] _____
   - Block Temperature at the end of the next 'ON' period _____
   - Energy Consumed at the end of the next 'ON" period[2] _____
   - Block Temperature at the beginning of the next 'ON' period _____

(4) Kitchen Ranges and Ovens (Continued)

Model No. of Model Tested _____

   - Energy Consumed at the beginning of the next 'ON' period[2] _____
   - Energy Consumed by an ignition device or other electrical components required for operation of the oven[1] _____
   - Energy Consumed during self cleaning test, if required[2] _____
   - Energy Consumed by an ignition device or other electrical components required for operation of the oven during self cleaning test, if required[1] _____
   - Gas consumption, or gas flow rate, of all continuously burning pilot lights during test.[1] _____
   - Elapsed time that pilot lights are under test[1] _____
   - Clock Power requirements, if any _____

3. Conventional Surface Unit Test Energy Consumption
   - Energy Consumed during test[2] _____
   - Final Test Block Temperature _____
   - Total Test Time _____
   - Electrical Energy Consumed by an ignition device for gas burners, if required[1] _____
   - Gas consumption, or gas flow rate, of all cooking top continuously burning pilot lights during test[1] _____
   - Elapsed Time that pilot lights are under test[1] _____

4. Microwave Oven Test Energy Consumption
   - Initial Temperature of the water test load for each test _____
   - Final temperature of the water test load for each test _____
   - Elapsed Time until temperature rise of water load is 45±9°F _____
   - Electrical Input Energy consumed during elapsed time. _____

NOTES

[1]Measurement for Gas Units only
[2]Energy Consumed is measured in Watt hours for electic ovens, and cubic feet of gas for gas ovens.

(5) Central Air Conditioners

Model No. of Model Tested

A. SEASONAL ENERGY EFFICIENCY RATIO (SEER)

1. For units with two speed compressors or two compressors, or cylinder unloading:

$$SEER = \frac{\sum_{j=1}^{8} \frac{Q(Tj)}{N}}{\sum_{j=1}^{8} \frac{E(Tj)}{N}}$$

Where Q(Tj) = Total Cooling Capacity at Temperature j
E(Tj) = Total Energy Usage (electrical power input) at Temperature j
N = Total Number of hours at all test temperatures

2. For units with single speed compressors this reduces to:

$$SEER = \frac{Qss(82F)}{Ess(82F)} \times PLF = EER_B \times PLF$$

where EER_B = Energy Efficiency Ratio of Test B
PLF = Part-Load Performance Factor

B. Summary of Unit Configurations and Tests Run

1. Type of unit configuration

_____a. Single Speed Compressor/Single Speed Condenser Fan
_____b. Single Speed Compressor/Multiple Speed Condenser Fan
_____c. Two Speed Compressor/Two Compressors/or Cylinder Unloading
_____d. Two Speed Compressor/Two Compressors/or Cylinder unloading Capable of varying the Sensible to Total (S/T) Capacity Ratio.

2. Test Methods Used

a. For Single Speed Compressors, attach one set of data from Test A, Test B, Test C, and Test D. For Two Speed Compressors/Two Compressors attach one set of data from Test A, Test B, Test C, and Test D for each Compressor Capacity or Speed.

b. Place an "X" under the appropriate Test to indicate the Method Chosen to create the cooling capacity data.

(5) Central Air Conditioners (Continued)

Model No. of Model Tested

Method	TEST A	TEST B	TEST C	TEST D
1) Indoor Side (Check one)				
a. Air Enthalpy				
b. Compressor Calibration				
2) Outdoor Side (Check one)				
a. Air Enthalpy				
b. Compressor Calibration				
c. Volatile Refrigerant Flow				

C. DATA TO BE RECORDED

1. General
Date of Test
Manufacturer
Test Unit Model No/Serial No.
Test Number
Test Run (Test A,B,C, or D)
Rated Compressor Cooling Capacity
Compressor Speed
Equipment Operating Time Before Testing Starts
Equipment Operating Time at Steady State
Data Measurement Recording Times
Cycling Times (where applicable)
Barometric Pressure
Electrical Input to Unit
Test Voltage, volts
Line Voltage Frequency, hz
Total Line Current, amps
Total Power Input, watts

2) Air Enthalpy Test
Apparatus Arrangement (Tunnel, Loop, Calorimeter, Room, Other)
Dry Bulb Temperature of Air Entering Equipment
Wet Bulb Temperature of Air Entering Equipment
Dry Bulb Temperature of Air Leaving Equipment
Wet Bulb Temperature of Air Leaving Equipment
Throat Diameter of Nozzle(s)
Temperature at Nozzle Throat
Pressure at Nozzle Throat
Velocity Pressure at Nozzle Throat or Static Pressure Difference Across Nozzles
External Resistance to Air Flow
Fan Speed(s), if adjustable
Refrigerant Liquid Temperature, Indoor Side
Refrigerant Liquid Temperature, Outdoor Side
Refrigerant Vapor Temperature, Indoor Side
Refrigerant Vapor Temperature, Outdoor Side
Diameter of Refrigerant Tube
Length of Refrigerant Line
Insulation Thickness on Interconnecting Tubing

(5) Central Air Conditioners (Continued)

	Model No. of Model Tested
3) Compressor Calibration Test	
Condensing Pressure or Temperature	
Evaporator Pressure or Temperature	
Temperature of Refrigerant Vapor Entering Compressor	
Temperature of Refrigerant Vapor Leaving Compressor	
Temperature of Low Side Refrigerant Vapor Entering Switchover Valve	
Temperature of High Side Refrigerant Vapor Leaving Switchover Valve	
Refrigerant or Surface Temperature Used to Determine Leakage Coefficient	
Refrigerant Liquid Temperature, Indoor Side	
Refrigerant Vapor Temperature, Indoor Side	
Refrigerant Vapor Pressure, Indoor Side	
Refrigerant Vapor Temperature, Outdoor Side	
Refrigerant Liquid Temperature, Outdoor Side	
Refrigerant Temperature Entering Condenser	
Refrigerant Temperature Leaving Condenser	
Refrigerant Pressure Entering Condenser	
Refrigerant Pressure Leaving Condenser	
Water Temperatures Entering Condenser	
Water Temperatures Leaving Condenser	
Ambient Temperatures Surrounding Condenser	
Average Temperatures of Condenser Jacket Surface	
Quantity of Condenser Cooling Water	
4. Volatile Refrigerant Flow Test	
Condensing Pressure or Temperature	
Evaporator Pressure or Temperature	
Refrigerant-oil Flow Rate	
Volume of Refrigerant in Refrigerant Oil Mixture	
Refrigerant Liquid Temperature, Indoor Side	
Refrigerant Vapor Temperature, Indoor Side	
Refrigerant Vapor Pressure	
Refrigerant Liquid Temperature, Outdoor Side	
Refrigerant Vapor Temperature, Outdoor Side	

(6) Clothes Dryers

	Model No. of Model Tested
A. ENERGY FACTOR (EF) FORMULA	
$EF = \frac{\text{Bone Dry Test Load Weight (lb)}}{\text{Total Energy Consumption/Cycle (kwh)}}$	
B. DATA TO BE RECORDED	
Date of Test	
Manufacturer	
Test Unit Model No./Serial No.	
Test Number	
Test Run	
Type of Unit	
Drum Capacity	
Power Input to Unit (kw)	
Line Current	
Voltage Applied to Unit	
Frequency	
Relative Humidity of Test Room	
Ambient Temperature of Test Room	
Gas Temperature	
Dryer Temperature Setting	
Dryer Timer Setting	
Bone Dry Test Load Weight	
Weight of Wet Test Load Before Test	
Moisture Content of Wet Test Load Before Test (%)	
Weight of Dry Test Load After Test	
Moisture Content of Dry Test Load after Test (%)	
Drying Time	
Total Electrical Energy Consumed During Test (kwh)	
Gas Consumed per Test Cycle (cu.ft.)[1]	
Gas Consumed by Pilot Light/hr (cu.ft.)[1]	
Gas Pressure at Inlet[1]	
Corrected Gas Heating Value[1]	
Total Energy Consumption per Cycle (kwh)	

1-For Gas Dryers Only

(7) Room Air Conditioners

Model No. of model tested

A. ENERGY EFFICIENCY RATIO (EER) FORMULA

$$EER\ (BTU/watt/hr) = \frac{\text{Cooling Capacity (BTU/hr)}}{\text{Electric Power Input (watts)}}$$

Where cooling capacity is calculated as the net total room cooling effect on the room side of the calorimeter and is simultaneously calculated as the net total room cooling effect on the outdoor side.

B. DATA TO BE RECORDED

Date of Test		
Manufacturer		
Test Unit Model No/Serial No.		
Test Number		
Test Run		
EER		
Cooling Capacity, Btu/hr		
Line Current, Amps		
Power Input, Watts		
Barometric Pressure, in Hg.		
Fan Speed (if variable), rpm		
Electrical Input to Sample		
Test Voltage, volts		
Line Voltage Frequency, hz		
Total Line Current, amps		
Total Power Input, watts		
Air Temperature, °F		
"Indoor" Room, DB		
WB		
"Outdoor" Room, DB		
WB		
Refrigerant Circuit Temp, °F		
Cooling Water Entering		
Cooling Water Leaving		
Condensed Water Leaving		
Humidifier Water Entering		
Other (Specify)		
Weight or Water Condensed by Sample, lb/hr		
Cooling Water Flow Rate, lb/hr		
Chassis Leakage Air Flow, cfm		
Static Air Pressure Difference, inches H_2O		
Cooling-Capacity		
"Indoor" Side Rating, Btu/hr		
"Outdoor" Side Rating, Btu/hr		
"Heat Balance", per cent		

No Comments_____ See Attached Sheet_____ Refer also to Test No._____

Administrator: _____ Reviewed By: _____

BILLING CODE 6450-01-C

(8) Freezers

Model No. of Model Tested

A. ENERGY FACTOR (EF) FORMULA

$$EF = \frac{\text{Adjusted Total Volume } (ft^3)}{\text{Average per cycle energy consumption (kw.hr./cycle)}}$$

Where energy consumption is calculated for a standard cycle. If the unit has an anti-sweat switch which is not set at the highest energy consuming position at the factory then the denominator becomes:

½(Average per cycle energy consumption with switch at highest energy consuming position + Average per cycle energy consumption with switch in position set at factory)

B. DATA TO BE RECORDED

Date of Test	
Manufacturer	
Test Unit Model No./Serial No.	
Test Number	
Test Run	
Type of Unit	
Type of Defrost System	
Total Refrigerated Volume	
Net Freezer Refrigerated Volume (cu.ft.)[2]	
Adjusted Total Refrigerated Volume	
Anti-Sweat Heater Switch Setting	
Power Input (kwh/cycle)	
Voltage applied to Unit	
Frequency	
Run-in Period (hours)	
Relative Humidity	
Ambient Temperature: Max. _____, min. _____ Avg.	
Average Freezer Compartment Temperature (total test)[1]	
Temp. Control at Warmest Position	
Temp. Control at Coldest Position	
Temp. Control at Mid Position	
Time of test Period (total test)	
Time of Testing at each Temp. Control Position	
Number of Cycles of Compressor During Total Test Period	
Number of Cycles of Compressor at each Temp. Control Position	
Energy Consumption (total test)	
Temp. Control at Warmest Position	
Temp. Control at Coldest Position	
Temp. Control at Mid Position	

1-For all average compartment temperatures keep information on all thermocouple locations and readings

2-Keep information on all sectional areas and volumes included in measurement

10 CFR Part 430

Energy Conservation Program for Consumer Products

AGENCY: Department of Energy.

ACTION: Notice of availability of environmental assessment and finding of no significant impact.

SUMMARY: The Department of Energy (DOE) announces the availability of its environmental assessment (EA) of its Energy Conservation Program for Consumer Products (DOE/EA-0113). DOE has determined, based on the EA, that this Program does not constitute a major Federal action significantly affecting the quality of the human environment, within the meaning of section 102(2)(C) of the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. 4321 *et seq.* Therefore, a finding of no significant impact, pursuant to 40 CFR 1501.4(e), is hereby issued to notify the public that an environmental impact statement is not required for this action.

ADDRESSES: For copies of the EA:

Department of Energy, Office of Hearings and Dockets, Forrestal Building, Room 1F-085, Mail Station 6B-025, 1000 Independence Avenue, S.W., Washington, D.C. 20585, Phone: 202-252-9319.

Department of Energy, Freedom of Information Reading Room, Forrestal Building, Room 5B-180, 1000 Independence Avenue, S.W., Washington, D.C. 20585, Phone: 202-252-6020.

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SUPPLEMENTARY INFORMATION:

I. Background

The Energy Policy and Conservation Act (EPCA) (Pub. L. 94-163), as amended by the National Energy Conservation Policy Act (NECPA) (Pub. L. 95-619), requires that the Department of Energy (DOE) prescribe energy efficiency standards for thirteen types of consumer products. These consumer products are sometimes referred to as "covered products." Standards for nine of these product types are required to be published in the **Federal Register** no later than December 24, 1980. The nine product types given priority by EPCA as amended, by NEPCA, and for which a rule is thereby proposed today, are refrigerators and refrigerator-freezers, freezers, clothes dryers, water heaters, room air conditioners, home heating equipment, not including furnaces, kitchen ranges and ovens, central air conditioners (cooling only), and furnaces. Standards for dishwashers, television sets, clothes washers, and humidifiers and dehumidifiers are required to be published in the **Federal Register** no later than November 9, 1981. Standards for central air conditioners (heat pumps) are required to be published in the **Federal Register** no later than January 23, 1982.

DOE'S first in prescribing energy efficiency standards for the thirteen product types was to publish three advance notices of proposed rulemaking in the **Federal Register.** The first, covering nine product types, was published on January 2, 1979 (44 FR 49). The second, covering dishwashers, television sets, clothes washers, and humidifiers and dehumidifiers, was published on December 13, 1979 (44 FR 72276). The third, covering heat pumps, was published on January 23, 1980 (45 FR 5602).

The notice of proposed rulemaking for energy efficiency standards for nine types of consumer products presents a discussion of DOE's basis for the proposed standards and the process for implementing the regulation. Ensuing sections deal with the legislative background, the standards implementation process, the phase-in period for standards, a discussion of the comments received as a result of the advance notice, a discussion of the product types and classes to which the proposed standards will apply, the certification and enforcement procedures proposed, a summary of the basis for arriving at maximum technologically feasible efficiency levels for each class of product, a summary of the basis for arriving at the minimum energy efficiency standards (intermediate and final) for each class of product, a discussion of state pre-emption petitions, small business exemptions, and a request for comments on various standards-related issues. In support of this proposed rule, the Department had developed six Technical Support Documents. These documents provide detailed information on important aspects of the proposed rule.

In accordance with its obligations under the National Environmental Policy Act (NEPA) (42 U.S.C. 4321, *et seq.*) and the Council of Environmental Quality regulations implementing the procedural provisions of NEPA (40 CFR 1500-1508), DOE stated in the advance notice of January 2, 1979 that it would prepare an Environmental Assessment on the impact of setting energy efficiency standards for the nine types of consumer products covered by the notice. Subsequent to publication of this advance notice, advance notices were published indicating that DOE is considering energy efficiency standards for dishwashers, television sets, clothes washers, humidifiers and dehumidifiers, and heat pumps. In order to produce a full environmental review of generically similar actions, thereby averting program segmentation, the Environmental Assessment being made available at this time addresses the potential environmental impacts of all thirteen types of consumer products.

The analyses in the Environmental Assessment indicated that air pollution and commitments of land and energy resources decreased as a result of decresing future energy demand. Indoor air quality was found to be at worst unaffected by implementation of standards and at best somewhat improved; the exact effect could not be measured because the design options that will be selected by manufacturers for improving the efficiency of gas-burning appliances could not be ascertained. The program was found to have no significant effect on water quality, noise levels or solid waste levels.

A maximum ("worst case") increase of about 4 percent (29 million pounds) in the production/consumption of chlorofluorocarbons in the United States is projected to occur by the year 1990 as a result of implementing the proposed standards, when compared to 1977 consumption levels. This increase is not considered to be significant for the following reasons:

- The "worst case" projection uses 1977 chlorofluorocarbon consumption in the appliances covered by the proposed standards as a baseline reference and assumes that, absent the proposed standards, there would not be any increase in the use of chlorofluorocarbons in those appliances. However, given the present trends in improving the energy efficiency of a number of these products, some increase in chlorofluorocarbon usage is likely to occur even without implementation of the proposed standards.
- The 4 percent projected increase in United States consumption represents only about 1 percent of world consumption of chlorofluorocarbons.
- The projected increase is small when compared to the approximately 470 million pound decrease in chlorofluorocarbon consumption that has occurred in the United States since 1973 with the phasing out (and, beginning in 1978, the total ban) of the use of chlorofluorocarbons in aerosol sprays. As a result of this decrease, total United States consumption of chlorofluorocarbons has dropped by over

150 million pounds per year since the peak year of 1973.

- The Environmental Protection Agency is currently developing strategies for the control of the release of chlorofluorocarbons into the atmosphere, and has been informed of the projected increase inconsumption due to the implementation of this proposed program. The Agency has informally stated that they believe that this potential increase can be mitigated through implementation of one or more of the control strategies presently under development. These strategies are discussed in the program environmental assessment.

Projected increases in the use of copper, steel, iron, aluminum, plastic and fiberglass were not considered to be significant, when compared to total U.S. production. In addition, it was found that money saved from lower operating costs would be likely to be spend on goods and services in the general economy and might therefore stimulate additional pollution which would not have occurred without the program. This amount was estimated to be minimal and to have no significant impact on future environmental quality.

The Environmental Assessment also summarized the socioeconomic impacts of the program in a number of areas. Change in the life cycle costs for consumers; The differential impact of the program on various income groups; Change in the profitability of manufacturers of consumer products; The value of the program to the Nation as a whole and to various regions of the country; Effects of the program on the health and safety of workers in the consumer product manufacturing industry; and Secondary effects of the program on the national economy, including effects on employment, inflation, gross national product, and balance of trade.

Alternatives to the energy efficiency standards as proposed were assessed from the perspective of environmental impact. None of the alternatives analyzed was found to vary significantly from the program with respect to its impact on the environment.

Based on the results of the Environmental Assessment, DOE has determined that the Energy Conservation Program for Consumer Products does not represent a major Federal action significantly affecting the quality of the human environment within the meaning of Section 120(2)(C) of NEPA.

II. Public Access to Information

Single copies of the EA may be obtained from the Office of Hearings and Dockets at the address listed above. Copies of the EA are also available for public review in the DOE Freedom of Information Reading Room at the address listed above, between the hours of 8 a.m., and 4 p.m., Monday through Friday, except Federal holidays.

Interested parties should be aware that a public meeting will be held on the Notice of Proposed Rulemaking on July 9, 1980 and that public hearings are scheduled to be held in Washington, D.C. over the period July 21–August 1, 1980 and in Chicago, Illinois over the period August 4–8, 1980. Mr. James A. Smith, whose address is listed above, can provide any additional information desired.

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Ruth C. Clusen,

Assistant Secretary for Environment.

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